

Ensuring Operational Access: Leveraging Engineering Contractors in the Pacific

A Monograph

by

MAJ Justin M. Pritchard

United States Army



School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

2015-001

Approved for public release; distribution is unlimited

REPORT DOCUMENTATION PAGE

*Form Approved
OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE (DD-MM-YYYY) 21-05-2015			2. REPORT TYPE Monograph	3. DATES COVERED (From - To) June 2014 - May 2015	
4. TITLE AND SUBTITLE Ensuring Operational Access: Leveraging Engineering Contractors in the Pacific			5a. CONTRACT NUMBER 5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER		
			5d. PROJECT NUMBER 5e. TASK NUMBER 5f. WORK UNIT NUMBER		
6. AUTHOR(S) MAJ Justin M. Pritchard			7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) School of Advanced Military Studies 250 Gibbon Avenue Fort Leavenworth, KS 66027		
			8. PERFORMING ORG REPORT NUMBER		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College 1 Reynolds Avenue Fort Leavenworth, KS 66027			10. SPONSOR/MONITOR'S ACRONYM(S) CGSC, SAMS 11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The Joint Operational Access Concept (JOAC) and Joint Concept for Entry Operations (JCEO) outline the specific operational requirements for gaining and maintaining operational access against anti-access/anti-denial threats. The joint engineer force supports operational access through the construction and repair of bases and supporting infrastructure. However, after over a decade of stability operations, the joint engineer force is inexperienced and ill prepared to support operational access for major operations in the Pacific Region. Using the theoretical lens of operational art, this study proposed the thesis that by supplementing existing engineering capabilities with construction and engineering support contractors, joint force commanders can ensure operational access. This study concluded that integration of construction and engineering support contractors during Phase I (Deter) and Phase II (Seize the initiative) operations allows joint force commanders to gain operational access by establishing and maintaining basing, maintaining operational tempo, and extending operational reach. Construction and engineering support contractors achieved this by demonstrating expeditionary capabilities and by providing expert and innovative solutions to military engineering problems. Additionally, the evidence suggests that the strategic context of a given operational environment, such as dispersed or concentrated basing, may govern the US military's ability to ensure interoperability with contractors while achieving operational access. Operational planners must clearly evaluate existing military engineering capabilities and operational requirements to identify specific engineering gaps. As part of the Total Force, construction and engineering support contractors serve as a viable option to help the US military achieve strategic objectives in the Pacific Region.					
15. SUBJECT TERMS Operational Art, JOAC, JCEO, Basing, Tempo, Operational Reach, Engineering, Contracting, Operational Access					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON COL Henry Arnold
a. REPORT (U)	b. ABSTRACT (U)	c. THIS PAGE (U)	(U)(U)	68	19b. PHONE NUMBER (include area code) (913)758-3313

Monograph Approval Page

Name of Candidate: MAJ Justin M. Pritchard

Monograph Title: Ensuring Operational Access: Leveraging Engineering Contractors in the Pacific

Approved by:

_____, Monograph Director
Bruce Stanley, PhD

_____, Seminar Leader
David Wood, COL

_____, Director, School of Advanced Military Studies
Henry A. Arnold III, COL

Accepted this 21st day of May 2015 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, PhD

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the US Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

Abstract

Ensuring Operational Access: Leveraging Engineering Contractors in the Pacific, by MAJ Justin M. Pritchard, 58 pages.

In January 2012, President Obama announced the US military would “pivot to the Pacific” to support and protect political and economic interests in the Region. To this end, the Joint Operational Access Concept (JOAC) and Joint Concept for Entry Operations (JCEO) outline the specific operational requirements for gaining and maintaining operational access against anti-access/anti-denial threats. The joint engineer force supports operational access through the construction and repair of bases and supporting infrastructure. However, after over a decade of stability operations, the joint engineer force is inexperienced and ill prepared to support operational access for major operations in the Pacific Region. Using the theoretical lens of operational art, this study proposed the thesis that by supplementing existing engineering capabilities with construction and engineering support contractors, joint force commanders can ensure operational access.

This study concluded that integration of construction and engineering support contractors during Phase I (Deter) and Phase II (Seize the initiative) operations allows joint force commanders to gain operational access by establishing and maintaining basing, maintaining operational tempo, and extending operational reach. Construction and engineering support contractors achieved this by demonstrating expeditionary capabilities and by providing expert and innovative solutions to military engineering problems. Additionally, the evidence suggests that the strategic context of a given operational environment, such as dispersed or concentrated basing, may govern the US military’s ability to ensure interoperability with contractors while achieving operational access. Operational planners must clearly evaluate existing military engineering capabilities and operational requirements to identify specific engineering gaps. As part of the Total Force, construction and engineering support contractors serve as a viable option to help the US military achieve strategic objectives in the Pacific Region.

Table of Contents

Acknowledgements	v
Acronyms	vi
Illustrations.....	vii
Introduction	1
Literature Review.....	7
Methodology	17
Case Studies	23
Case Study #1: Wake Island.....	23
Wake Island Findings and Analysis	36
Case Study # 2: Vietnam War	37
Vietnam War Findings and Analysis.....	48
Findings and Analysis	50
Structured, Focused Comparison Analysis.....	52
Conclusion.....	56
Bibliography.....	59

Acknowledgements

I would like to thank Dr. Stanley and COL David Wood, whose patience, mentorship, and guidance greatly contributed to my personal and professional growth. I am especially appreciative of my fellow syndicate and seminar members, who graciously assisted my research and completion of this monograph. Beth, my wonderful bride, thank you for your support and encouragement throughout this project; together, we are strong.

Acronyms

A2AD	Anti-access/anti-denial
ADP	Army Doctrinal Publication
ADRP	Army Doctrinal Reference Publication
ATTP	Army Tactics, Techniques, and Procedures
CB	Construction Battalions
COMUSMACV	Commander of US Military Assistance Command-Vietnam
CPNAB	Contractors Pacific Naval Air Bases
FM	Field Manual
JCEO	Joint Concept for Entry Operations
JOAC	The Joint Operational Access Concept
JP	Joint Publication
MAVC	Military Assistance Command-Vietnam
NATO	North Atlantic Treaty Organization
NAVFAC	Naval Facilities Engineering Command
OICC	Officer in Charge of Construction
RMK	Raymond, Morrison-Knudsen
RMK-BRJ	Raymond, Morrison-Knudsen-Brown, Root, and Jones

Illustrations

Figures

1	Wake Island, December 1941	24
2	South Vietnam Port and Airfield Construction.....	

Error! Bookmark not defined.1

Tables

1	Summary of Findings and Analysis.....	54
---	---------------------------------------	----

Introduction

Separated by two expansive oceans, the United States has a long-standing requirement to project combat power and gain operational access throughout the world. The joint force must set conditions to project combat power to support the nation's strategic objectives. These conditions include, but are not limited to, the construction and repair of ports, infrastructure, and airfields to allow the flow of combat power into an operational area. After over a decade of stability operations, the joint engineer force is inexperienced and ill prepared to support operational access for major operations in the Pacific Region. In January 2012, President Obama announced that the US military would "pivot to the Pacific" to support and protect political and economic interests in the region.¹ Soon after, the Department of Defense published *The Joint Operational Access Concept (JOAC)* for gaining and maintaining operational access against anti-access/anti-denial (A2AD) challenges in an operational area.² This document outlines the requirements and anticipated conditions for projecting combat power. In 2014, *The Joint Concept for Entry Operations (JCEO)* outlined the specific operational requirements that support the JOAC.³ These requirements exist in both permissible and non-permissible environments; however, against an armed force, the requirements and resources to gain and maintain operational access increase significantly. This challenge magnifies as the United States reduces its military forward basing due to fiscal constraints and strategic objectives.

Reduced forward basing decreases the US military's ability to rapidly project combat power and adapt to changing threats. Restructuring of the joint engineer force limits the amount of available forces to provide operational support to joint operational access operations.

¹ Department of Defense, *Sustaining US Global Leadership: Priorities for the 21st Century Defense* (Washington, DC: Government Printing Office, 2011), 2.

² Office of the Chairman, Joint Chiefs of Staff, *Joint Operational Access Concept (JOAC) VI.0* (Washington, DC: Government Printing Office, 2012), iii.

³ Office of the Chairman, Joint Chiefs of Staff, *The Joint Concept for Entry Operations (JCEO) VI.0* (Washington, DC: Government Printing Office, 2014), 1.

Moreover, stability operations in Iraq and Afghanistan over the past decade contributed to the atrophy of expeditionary engineering capabilities. Reduced forward basing, fewer available engineers, and degraded capabilities made it difficult for the joint engineer force to support operational access requirements. Therefore, the joint force should consider the use of construction and engineering support contractors to supplement existing engineering capabilities to ensure operational access. Construction and engineering support contractors working in support of Phase I (Deter) and Phase II (Seize the initiative) operations allows joint force commanders to establish and maintain basing, maintain operational tempo, and extend operational reach.⁴ This requires expeditionary contractors, innovative and expert solutions, and ensured interoperability.

Operational access and contractor integration are familiar challenges for the US military. The US military has a long history of using construction and engineering support contractors to support operational access in major operations. As early as the 1920s, the United States anticipated a war with the Japanese. In 1938, as part of Operational Plan Rainbow 5, Congress approved funds for construction of an air base on Wake Island to increase defenses against a likely Japanese attack.⁵ Similarly, in 1964, Lyndon B. Johnson authorized a consortium of civilian contractors to improve the infrastructure of South Vietnam to enable escalation of military forces if necessary.⁶

The US military's operational requirements in the Pacific are likely to increase despite rising fiscal constraints. Though the likelihood of major operations involving forced entry against an armed force with A2AD capabilities is low, the United States must prepare for this contingency. Humanitarian assistance and disaster relief operations are also likely to present

⁴ Joint Publication (JP) 3-0 *Joint Operations* (Washington, DC: Government Printing Office, 2011), V-8.

⁵ Duane Schultz, *Wake Island* (New York: St. Martin's Press, 1978), 10.

⁶ James M. Carter, "The Vietnam Builders: Private Contractors, Military Construction and the 'Americanization' of United States Involvement in Vietnam" *Graduate Journal of Asia-Pacific Studies* 2, no. 2, (November 2004): 44.

additional operational access challenges throughout the region. These factors make research for gaining and maintaining operational access in major operations highly relevant. Before presenting the literature review, it is important to identify and define key terms used in this study.

To provide clarity and avoid confusion, this study defines the following terms, construction support contractor, engineering support contractor, and operational access. For simplicity, this study refers to construction and engineering support contractors simply as contractors. In general, contractors are civilian personnel who may accompany military forces in the field, but are not considered combatants or non-combatants. The US military manages contractors through contracts rather than the chain of command. The terms and specifications of the contract is the only means for guiding a contractor's performance.⁷ A construction support contractor is a civilian who conducts general engineering activities that modify, maintain, or protect the physical environment. General engineering can include a wide range of horizontal, vertical, and specialized construction tasks for large-scale and expeditionary operations.⁸ An engineering support contractor provides engineering design services required to perform and execute military engineering operations. Engineering support contractors may perform engineering design services separately or in conjunction with construction support operations. Operational access is the ability to project military force into an operational area with sufficient freedom of action to accomplish the mission.⁹

This study uses operational art as its theoretical framework. The joint force defines operational art as “the cognitive approach by commanders and staffs—supported by their skill, knowledge, experience, creativity, and judgment—to develop strategies, campaigns, and

⁷ Field Manual (FM) 3-34, *Engineer Operations* (Washington, DC: Government Printing Office, 2014), 3-14.

⁸ Joint Publication (JP) 3-34, *Joint Engineer Operations* (Washington, DC: Government Printing Office, 2011), IV-5.

⁹ JOAC, 1.

operations to organize and employ military forces by integrating ends, ways, and means.”¹⁰ The US Army defines operational art as, “the pursuit of strategic objectives, in whole or in part, through the arrangement of tactical actions in time, space, and purpose.”¹¹ These definitions provide the criteria to evaluate how the US military incorporated civilian contractors into major operations throughout history. This framework is appropriate because the application of operational art is inherent in operational access.

The following research hypotheses guided the study to determine if the joint force should consider the use of construction and engineering support contractors to supplement existing engineering capabilities to ensure operational access:

1. When construction and engineering support contractors are expeditionary, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach.
2. When construction and engineering support contractors provide innovative and expert solutions, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach.
3. When the US military ensures interoperability with construction and engineering support contractors then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach.

This study used the following focused questions to guide the collection of empirical evidence to determine if the hypotheses are supported:

1. What were the construction and engineer support requirements to ensure operational access?

¹⁰ JP 3-0, GL-14.

¹¹ Army Doctrinal Publication (ADP) 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, 2011), 9.

2. What military and contracted engineering means did the joint force commander allocate to ensure operational access?
3. Were the construction and engineer support contractors expeditionary?
4. Did construction and engineer support contractors provide innovative and expert solutions?
5. Why did the US military use construction and engineer support contractors instead of uniformed forces?
6. Did the US military ensure interoperability with construction and engineering support contractors?

The availability of primary and secondary sources, time, and scope limited the research of this study. Primary and secondary sources for the literature review and case studies are limited to Joint and Army doctrinal publications, books, professional articles, dissertations, and monographs. The research period for this study did not allow for travel to investigate additional archives or to visit the sites of the historical case studies referenced in this monograph. The delimitations emplaced by the researcher also shaped the scope of this study.

The feasibility of using construction and engineering support contractors to supplement existing engineering capabilities to ensure operational access shaped the delimitations of this study. As such, the first delimitation is identifying historical examples where construction and engineering support contractors supported operational access in major operations in a semi-permissible or permissible environment. The second delimitation is restricting the use of historical case studies from the Pacific region since the First World War. This delimitation supported potential future application to the US military's "pivot to the Pacific." The third delimitation used by the research in this study was to limit the scope of construction and engineering contract support during Phase I (Deter) and Phase II (Seize the initiative) operations. The fourth delimitation used by the researcher in this study was the exclusion of historical

examples involving construction and engineering support contracting support to multinational and coalition partners.

This research study is divided into six sections. This section included the background of the study, statement of the problem, significance of the study, definition of terms, theoretical framework, hypothesis and research questions, limitations, and delimitations. The second section includes a literature review of works related to the topic of operational access and construction and engineering support contracting. The third section provides the methodology used in the research study. This research study uses case studies to test the research hypotheses and form conclusions. The fourth section provides an in depth analysis of case studies involving construction and engineering support contractors during major operations. The fifth section provides the findings and analysis of this research study. Finally, the sixth section provides the conclusion and implications of the findings and analysis of this research study.

Literature Review

This section provides the rationale for using operational art as a theoretical lens from which to view contracting support to operational access. Army doctrine defines operational art as “the pursuit of strategic objectives, in whole or in part, through the arrangement of tactical actions in time, space, and purpose.”¹² Though some historians point to the American Civil War as the possible origin of American operational art, the US military did not solidify operational art in its doctrine until the early 1980s.¹³ The Soviets were the first to develop a doctrinal expression of operational art in the 1920s.¹⁴ This study compares the early Soviet definition of operational art with the modern military expression. This section also demonstrates the link between operational art and the JOAC and the JCEO. It defines the key conceptual terms of basing, operational reach, and tempo as they relate to operational art, operational access, and the joint operations phasing model. Lastly, this section explores the modern literature and demonstrates how it relates to the three proposed hypotheses in this study.

To understand the application of operational art as a means to ensure operational access one must first study its theoretical history. During the interwar period, General-Major Aleksandr A. Svechin, a professor of history and strategy at the Soviet Military Academy, developed the first theoretical and doctrinal expression of operational art.¹⁵ The introduction of trench warfare, tanks, airplanes, and machine guns greatly increased the complexity of warfare following First World War. In the 1920s, the Soviets developed operational art, a new cognitive approach to deal with the new complexities of warfare. In his 1927 work *Strategy*, Svechin described operational

¹² Army Doctrinal Reference Publication (ADRP) 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, 2012), 4-1.

¹³ Shimon Naveh, *In Pursuit of Military Excellence: the Evolution of Operational Theory* (London: Routledge, 1997), 16.

¹⁴ Michael D Krause and Cody R Phillips, *Historical Perspectives of the Operational Art* (Washington, DC: Military Bookshop, 2010), 8.

¹⁵ A Svechin, *Strategy*, ed. Kent D. Lee (Minneapolis: East View Publications, 1992), 23.

art as the bridge between strategy and tactics whereby the commander, through his intent and plan, linked a series of tactical actions together to achieve strategic success.¹⁶ To use his analogy, “tactics takes the steps that make up an operational leap, and strategy points the way.”¹⁷ Svechin also realized strategic success depended upon not only tactical success, but also the logistics required to conduct the operation without interruption until the commander achieved his desired end state.¹⁸ His theory closely resembles the modern definitions of tempo, basing, and operational reach. These concepts are described in detail later in this section. Svechin’s expression of operational art created a clear theoretical pathway for the Red Army to achieve strategic success and paved the way for other Soviet theorists.

G.S. Isserson and V.K. Triandafillov further developed the Soviet concept of operational art with the inclusion of systems and deep operations theory. Isserson, a Soviet brigade commander in the 1930s, saw that the purpose of operational art was to arrange the diverse effects of modern weaponry and forces in simultaneous or sequential operations across a theater of operations.¹⁹ In his 1938 work, *The Evolution of Operational Art*, Isserson consistently refers to friendly and enemy operations as a system. The Red Army could disintegrate the enemy’s command and control by using operational shock once they identified weaknesses in the enemy’s system. Operational shock resulted from what Triandafillov, former Deputy Chief of the Soviet Generals Staff, referred to as the application of operational art to achieve rapid decisive blows to the maximum depth of the enemy formation.²⁰ In his 1929 work, *The Character of Operations of*

¹⁶ Aleksandr A. Svechin, *Strategiya*, 2nd ed. (Moscow: Voennyî Vestnik, 1927), 14ff, quoted in Michael Krause and R. Cody Phillips, *Historical Perspectives of the Operational Art* (Washington DC: Center of Military History, 2007), 214.

¹⁷ Svechin, *Strategy*, 4th ed., ed. Kent D. Lee, 269.

¹⁸ Ibid., 69.

¹⁹ Krause and Phillips, *Historical Perspectives of the Operational Art*, 8.

²⁰ V. Triandafillov, *Cass Series On the Soviet Study of War*, ed. Jacob W. Kipp, vol. 5, *The Nature of the Operations of Modern Armies* (Ilfor: F. Cass, 1994), 149-50.

Modern Armies, Triandafillov developed the theory of deep operations within the domain of operational art. Like Svechin, Triandafillov concluded that a single decisive operation is not possible in a major war between large states. He believed victory belonged to the force that could conduct a series of successive and coherent operations.²¹ Successive operations meant defeating the enemy force through its depth using penetration, breakthrough, exploitation, and pursuit to achieve the strategic goals set forth in the campaign plan.²² Successful deep operations required the Red Army to have extended operational reach to avoid culmination.

Shimon Naveh, a retired Israeli brigadier general, introduced General Systems Theory as a way to define and apply operational art to military problems in his 1997 work, *In Pursuit of Military Excellence*. Developed by the Hungarian scientist, Ludwig von Bertalanffy in the 1940s, General Systems Theory is an interdisciplinary approach that explains the various phenomena in a system, identifies the laws that govern a system, and provides their rationale.²³ Naveh argued that military systems are open system where the environment interacts with and changes the material within the system. Similar to Beralanffy's description of open systems, a cognitive tension exists between a military system's strategic aim and the individual aim of its tactical subsystems. Operational art seeks to produce a synergistic effect through this cognitive tension to achieve strategic objectives.²⁴ It is here that Naveh points to the necessity of operational art. Army doctrine seems to reflect Naveh's argument when it states that "without operational art, tactical actions devolve into a series of disconnected engagements that do not accomplish the mission or objectives of the joint force."²⁵

²¹ Kipp, *The Nature of the Operations of Modern Armies*, xviii.

²² Ibid., xviii.

²³ Naveh, *In Pursuit of Military Excellence*, 3.

²⁴ Ibid., 7.

²⁵ ADRP 3-0, 4-1.

A review of the literature surrounding operational art revealed several key concepts that relate to ensuring operational access as outlined in the JOAC and JCEO. The JOAC describes how the Joint Force will gain access to a theater of operation across various domains in the midst of enemy A2AD systems. The JCEO describes how the Joint Force could “project and employ military force onto foreign territory in hostile and uncertain environments once operational access has been established.”²⁶ The JOAC and JCEO provide eleven principles and twenty-one capabilities the joint force will likely need to follow and maintain during future operational access missions. This study, however, focused on only three of the principles and capabilities that most closely related to operational art. According to Army doctrine, basing, operational reach, and tempo are elements of operational art the help commanders arrange tactical actions to achieve strategic objectives. Engineers specifically contribute to basing, operational reach, and tempo through operational construction. The next section outlines these key concepts in detail. Understanding these concepts provides a context for engineering effort associated with gaining and maintaining operational access.

The JOAC views basing as critical “access infrastructure” that mitigates the effect of distance on force projection.²⁷ Joint doctrine defines basing as a location from which operations are projected or supported.²⁸ According to Army doctrine, “basing directly enables and extends operational reach, and involves the provision of sustainable facilities and protected locations from which units can conduct operations.”²⁹ A reduction in forward basing due to changing threats and budgetary limitations places a premium on entry operations to gain operational access. The JCEO states that entry operations will include the use of multiple permanent and temporary basing

²⁶ JCEO, 5.

²⁷ JOAC, 19.

²⁸ Department of Defense, Joint Publication (JP) 4-0, *Joint Logistics* (Washington, DC: Government Printing Office, 2008), GL-5.

²⁹ Army Doctrinal Reference Publication (ADRP) 4-0, *Sustainment* (Washington, DC: Government Printing Office, 2012), 3-9.

options to produce the greatest advantage in terms of position, throughput, protection, and surprise.³⁰ Engineers will play a critical role in establishing what the JCEO calls “appropriate operational conditions” through construction, maintenance, and transition of basing options.³¹ This study used a combination of the Joint and Army doctrinal definitions for basing; where basing is a location from which the joint force projects or supports operations to ensure sufficient operational reach.

Joint doctrine defines operational reach as the distance and duration across which a joint force can successfully employ military capabilities.³² Conversely, the culminating point is the point at which the joint force cannot employ its military capabilities to achieve its assigned mission. Army doctrine refers to operational reach as an indicator of a well-conceived operational approach.³³ This study adopted the Joint definition of operational reach. The JCEO states the importance of pre-crisis logistics operational preparation of the environment to extend operational reach and prevent culmination during operations.³⁴ An assessment of existing airfields, ports, facilities, and infrastructure within a theater of operation helps identify the construction and protection requirements during an operation. Engineers help commanders preserve combat power, and ultimately operational reach, through the construction of protective structures. In short, engineers extend operational reach through construction of logistics infrastructure and protection facilities.

³⁰ JCEO, 21.

³¹ Ibid., 11.

³² JP 3-0, GL-15.

³³ ADRP 3-0, 4-5.

³⁴ JCEO, 12.

Controlling tempo allows the commander to gain or maintain the initiative during combat operations and a sense of normalcy during humanitarian assistance operations.³⁵ The Army, and this study, defines tempo as the relative speed and rhythm of military operations over time with respect to the enemy.³⁶ In the JOAC, the Chairman of the Joint Chiefs of Staff, General Dempsey, underscores the importance of tempo to exploit local opportunities and disrupt enemy systems to ensure operational access.³⁷ Dempsey envisions the joint force using multiple domains (land, air, maritime, cyber, space) simultaneously and unpredictability to disrupt, defeat, and destroy enemy area-denial systems and gain operational access to complete assigned missions.³⁸ The joint force achieves simultaneity and unpredictability largely by controlling tempo. Likewise, the joint force cannot control tempo if basing options constrains their operational reach. Therefore, it is clear, engineers serve a critical role in supporting operational tempo during operational access missions. The next section demonstrates the links between basing, operational reach, operational tempo, and the joint operations phasing model.

The majority of operational access activities occur during the first two phases of the joint force phasing model: Phase I (Deter) and Phase II (Seize the initiative).³⁹ During Phase I, the joint force deters undesirable actions from adversaries through friendly capabilities and builds upon actions taken during the shaping phase. This includes, establishing and maintaining access to operational areas, ensuring forward basing,⁴⁰ and identifying infrastructure requirements.⁴¹ Principle engineering tasks during Phase I involve establishment of advanced and intermediate

³⁵ ADRP 3-0, 4-7.

³⁶ Ibid.

³⁷ JOAC, Forward.

³⁸ JCEO, 11.

³⁹ JP 3-0, V-7.

⁴⁰ Ibid., V-8.

⁴¹ Ibid., V-40.

staging bases, airfield, bed down facilities to support the forward deployment of personnel, equipment, and logistics.⁴² During Phase II, joint forces seize the initiative from adversaries through the decisive use of joint force capabilities.⁴³ The joint force sets conditions for decisive operations, conducts operations “to gain access to theater infrastructure and expand friendly freedom of action,”⁴⁴ and provides protection for ports of debarkation.⁴⁵ Engineers construct and improve forward infrastructure and facilities during Phase II.⁴⁶ In short, Phase I and II operations require significant engineer and construction support to gain operational access and allow the joint force to gain a position of relative advantage over its adversaries. All of these operations and engineering activities contribute to the joint force commander’s ability to establish and maintain basing, maintain operational tempo, and extend operational reach. The next part of this section presents literature related to the proposed hypotheses.

This study proposed three hypotheses to demonstrate how operational art is a useful tool to describe how contractors support military engineers to gain operational access. The first hypothesis states that when construction and engineering support contractors are expeditionary then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. Joint doctrine defines an expeditionary force as an armed force organized to accomplish a specific objective in a foreign theater.⁴⁷ This study applied this definition to expeditionary contractors; however, without the requirement of carrying weapons. A

⁴² JP 3-34, IV-8.

⁴³ JP 3-0, V-8.

⁴⁴ Ibid.

⁴⁵ Ibid., V-44.

⁴⁶ JP 3-34, IV 8-9. Phase II construction includes joint reception, staging, and onward integration facilities, improvement or construction of advanced bases, air points of debarkation, sea points of debarkation, highways, railroads, bridges, tunnels and communications infrastructure.

⁴⁷ Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2010), 98.

review of the literature revealed several conditions where expeditionary contractors held advantages over military engineers. The first condition involved rapid mobilization. In his strategic research project at the US Army War College, "Civilianizing Army Generating Forces," Colonel Donald Curtis states that in contingencies requiring rapid mobilization, the Army had to use contractors because they could leverage manpower already in theater and did not compete for limited military lift to deploy into theater.⁴⁸ The second circumstance involved operational tempo. In his US Army War College research project, Colonel Michael DeBow, recommended that operational planners consider the use of construction contractors to supplement active duty engineer units when the operational tempo is extremely high.⁴⁹ Finally, DeBow and a 2013 Congressional Report highlighted that expeditionary contractors filled critical manpower gaps when political decisions limited the amount of military forces in a theater of operations.⁵⁰ Overall, a review of the literature showed that expeditionary contractors who were not fully dependent upon military lift assets to deploy into theater enabled operational access the most.

The second hypothesis states that when construction and engineering support contractors provide innovative and expert solutions, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. During Operation Joint Endeavor in Bosnia, DeBow found that contractors were best suited for highly complex construction projects involving massive scope, where they can apply technical depth, engineering

⁴⁸ Donald R. Curtis Jr., "Civilianizing Army Generating Forces" (master's thesis, US Army War College, 2000), 10.

⁴⁹ Michael J. DeBow "Construction Contracting: Strategic and Operational Engineering Harnesses the Private Sector in Support of United States National Security Objectives" (master's thesis, US Army War College, 1996), 33.

⁵⁰ Moshe Schwartz and Jennifer Church, *Department of Defense's Use of Contractors to Support Military Operations: Background, Analysis, and Issues for Congress* (Washington, DC: Congressional Research Service, 2013), 3, accessed January 18, 2015, <https://www.fas.org/sgp/crs/natsec/R43074.pdf>.

expertise, and diversity of equipment found only in the private sector.⁵¹ Moreover, DeBow notes that a lack of governmental restrictions such as processes and supply chains, allows contractors to “use initiative and creativity to overcome problems in either austere or politically sensitive environments.”⁵² Curtis provides a similar assessment, when he states that contractors provide the obvious advantage of accessing the broad range of capabilities within the private sector, particularly those that do not exist in the military.⁵³ The implied task for operational planners is to identify capability gaps within their engineer force structure early on to leverage capabilities within the private sector to seize the initiative during operational access missions.

The final hypothesis states that when the US military ensures interoperability with construction and engineering support contractors then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The literature review demonstrated a gap in available data on how contractor interoperability contributes directly to the application of operational art in operational access missions. However, the literature clearly solidified the involvement of contractors in support of future expeditionary and wartime operations. A 2013 Congressional Report quotes Dempsey stating that operational contract support is no longer a “niche capability,” but rather a part of the total military force.⁵⁴ Therefore, it stands to reason that operational contracting will remain a part of major operations in the future. While DeBow describes a synergistic effect between military engineers, Curtis cites the lack of direct command and control and mutual trust as a marked disadvantage when using contractors in concert with military engineering units.⁵⁵ Another challenge for interoperability is

⁵¹ DeBow, "Construction Contracting," 34.

⁵² Ibid., 11.

⁵³ Curtis, "Civilianizing Army Generating Forces," 10.

⁵⁴ Schwartz and Church, *Department of Defense's Use of Contractors to Support Military Operations*, 12.

⁵⁵ Curtis, "Civilianizing Army Generating Forces," 11.

the command burden of providing security for contractors working in support of military engineers. This burden ultimately reduces operational flexibility and potentially limits the joint force's operational reach and tempo.⁵⁶

The aim of this section was to justify operational art as an appropriate theoretical lens from which to view contracting support to operational access. Operational art, as defined in Joint and Army doctrine, draws its inspiration from early Soviet deep operations theory. Soviet military theorists like Svechin, Triandafilov, and Isserson laid the foundation for the contemporary concepts of basing, operational reach, and tempo. Basing, operational reach, and tempo are critical elements that support operational access as described in the JOAC and JCEO. This section also demonstrated the high volume of engineering requirements to during the first two phases of the joint operations phasing model. Lastly, it provided a review of modern literature associated with the three proposed hypotheses presented in this study.

⁵⁶ Curtis, "Civilianizing Army Generating Forces," 12.

Methodology

The research objective of this study was to analyze how the US military used construction and engineering support contractors to supplement existing engineering capabilities to gain operational access in a theater of operations. Viewed through the theoretical lens of operational art, this study proposed three hypotheses to demonstrate how construction and engineering support contractors allow joint force commanders to establish and maintain basing, maintain operational tempo, and extend operational reach. Two case studies that support the research objective help test the proposed hypotheses. A structured, focused comparison methodology guided the analysis and findings during the study. To focus the comparison of both case studies, six focused questions identify ways in which contractors contributed to basing, operational tempo, and operational reach. This section also outlines the sources used to collection data for this study. Seven parts divided this section: introduction, case study, specific methodology, hypotheses, structured questions, data collection, and summary.

Case studies provide a means to test research hypotheses against concrete, context-dependent phenomena to develop explanatory and general theoretical knowledge.⁵⁷ Alexander George and Andrew Bennett state that a well-defined research objective should guide the selection of case studies dealing with a single phenomenon.⁵⁸ Therefore, this study uses two historical case studies within the Pacific region that supported the overall theoretical framework and research objective. The first case study involves the use of contractors to build a naval air station on Wake Island in anticipation of war with the Japanese before World War II. The second case study involves the use of contractors to improve South Vietnam's infrastructure in 1964 to

⁵⁷ Bent Flyvbjerg, ed., “Case Study” in *The Sage Handbook of Qualitative Research (Sage Handbooks)*, 4th ed., ed. Norman K. Denzin and Yvonna S. Lincoln (Thousand Oaks: SAGE Publications, Inc, 2011), 302.

⁵⁸ Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge: The MIT Press, 2005), 69.

enable escalation of military forces in Vietnam. The next part of this section describes the specific methodology used in this study.

This study used the method of structured, focused comparison to guide and standardize data collection. George and Bennett describe this as a simple and straightforward method where the researcher asks general questions of the case studies that reflect the research objective. They considered this method structured because it allows for the systematic comparison and accumulation of findings of the case studies. The study achieves this by asking the same focused questions of both case studies to provide evidence that suggests support, does not support, or produces a mixed outcome for the proposed hypotheses. This study remains focused because it only concentrates on variables within the case studies that pertain to the research objective and theoretical focus.⁵⁹ The next section discusses the hypotheses, focused questions, and data collection used during the study.

The first hypothesis states that when construction and engineering support contractors are expeditionary, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. A reduction in forward basing requires the joint force to develop and maintain expeditionary capabilities to respond to emerging global threats. Therefore, the researcher expected to find that construction and engineering support contractors must demonstrate the same expeditionary capability and responsiveness to effectively support the joint force commander during entry operations.

The second hypothesis states that when construction and engineering support contractors provide innovative and expert solutions, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. Operational access depends upon the availability and serviceability of airfields, ports, and other infrastructure. Restructuring of the joint engineer force limits the amount of available forces to provide operational support to operational access operations. Moreover, stability operations in Iraq and

⁵⁹ George and Bennett, *Case Studies and Theory Development in the Social Sciences*, 67.

Afghanistan over the past decade contributed to the atrophy of expeditionary engineering capabilities. However, private contractors with experience in the construction and maintenance of these facilities are likely to have access to and can leverage innovations within private industry. The researcher expected to find that innovations and expert solutions to enhance construction and engineering support contractor's ability to support operational access.

The third hypothesis states that when the US military ensures interoperability with construction and engineering support contractors, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The North Atlantic Treaty Organization (NATO) defines interoperability as "the ability to act together coherently, effectively, and efficiently to achieve Allied tactical, operational, and strategic objectives."⁶⁰ This study applies the NATO definition of interoperability to the execution of contractor management as described in Joint doctrine,⁶¹ focusing specifically on how the military oversees, integrates contractor personnel and equipment into directed missions, and provides for their protection.⁶² Additionally, the JOAC specifically outlines the need for commanders to direct, support, and protect contractors in their assigned areas of responsibility.⁶³ The researcher expects the evidence found in both case studies to support this hypothesis.

The study used six focused questions to guide the research and data collection of each case study. The researcher asked the same questions of each case study, facilitating a qualitative comparison of each case study against the research hypotheses. What follows is a detailed explanation of each questions and their importance to the study.

⁶⁰ North Atlantic Treaty Organization (NATO), AAP-06, *NATO Glossary of Terms and Definition (English and French)* (Brussels: NATO Standardization Agency, 2014), 2-I-8.

⁶¹ Department of Defense, Joint Publication (JP) 4-10, *Operational Contract Support* (Washington, DC: Government Printing Office, 2014), I-2.

⁶² Army Tactics, Techniques, and Procedures (ATTP) 4-10, *Operational Contract Support Tactics, Techniques, and Procedures* (Washington, DC: Government Printing Office, 2011), 5-12.

⁶³ JOAC, 33.

The first question was what were the construction and engineering support requirements to ensure operational access. This question provides the scope and scale of the engineering effort for each case study. It considers the comprehensive engineering and construction problem without evaluating the particular means allocated to solve the problem. The question allows the researcher to understand how the engineering problem fits into the broader operational access context.

The second question asked what military and contracted engineering means the joint force commander allocated to ensure operational access. This question seeks to understand the composition, capabilities, structure, and disposition of the engineering means used in each case study. Additionally, it is important to understand why certain capabilities were not allocated to meet the engineering requirements in each case study. The researcher expected to find a capability gap between the allocated means and the engineering support requirement to ensure operational access.

The third question queries the ability of construction and engineering support contractors to meet the expeditionary needs of the joint force commander. The US military organizes expeditionary forces to accomplish specific object in a foreign country.⁶⁴ This question is important because it demonstrates the contractor's ability meet expeditionary requirements otherwise provided by military forces. The researcher expected to find that contractors were indeed expeditionary, and enabled the creation and expansion of the lodgment, forward basing, and lines of communication.

The fourth question evaluated whether engineering and support contractors provided innovative and expert solutions to support operational access. Budgetary limitations prevent the military from maintaining engineering capabilities for all imaginable contingencies within its force structure. Joint doctrine acknowledges the requirement for contractor support for large tasks

⁶⁴ Department of Defense, Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2010), 98.

like new port construction.⁶⁵ Private contractors with a particular expertise, such as port construction, normally have greater expertise and access to innovation within their respective industries. The researcher expected to find that when contractors provided innovative and expert solutions, then joint force commanders are able to successfully gain and maintain operational access.

The fifth question addressed the decision to use construction and engineering support contractors instead of military forces to solve operational access engineering problems. In a perfect situation, a joint force commander will have sufficient military engineer forces to solve engineering or construction problems. However, as the researcher anticipated, the engineering problem may be much larger or more complex than the available military engineering forces can handle. The availability of military engineering forces to support operational access in a particular theater of operation is a factor of the size of the force and the priority of existing support missions throughout the world. The researcher expected to find that engineering and support contractors filled the capability gaps to ensure operational access.

The sixth question asked whether the US military ensured interoperability with construction and engineering support contractors. As previously stated, interoperability seeks to improve cohesion, efficiency, and effectiveness while completing an assigned missions.⁶⁶ This study applies this definition to the concepts of oversight, integration, and protection described in Army doctrine.⁶⁷ Joint commanders that ensure interoperability between subordinate units and partners are flexible and can adapt to changes in the environment. The researcher expected to find that construction and engineering support contractors who ensured interoperability were effective during entry operations.

⁶⁵ JP 3-34, IV-25.

⁶⁶ NATO, AAP-06, 2-I-8.

⁶⁷ ATTP 4-10, 5-12.

Data collection for this study relied upon doctrinal publications, primary, and secondary writing sources. Joint and Army doctrinal publications, to include the JCEO and JOAC provided definitions and operational guidance related to operational access and entry operations. Historical records provided data on available military engineering structure and capabilities. Primary sources provided first-hand observations of the use of contractors to support operational access for each case study. Secondary sources provided analysis of the events surrounding and contained within each case study.

This section described the purpose of this study and outlined the specific methodology used to direct its analysis and findings. The study relied upon two case studies to test the three proposed hypotheses. Six focused questions enabled a structured, focused comparison of both case studies. Data collection for the study included doctrinal, primary, and secondary sources related to operational access. In addition, military records provided information regarding historical and current military engineering capabilities. This section described the anticipated answers to the structured research questions with the expectation that all hypotheses are valid.

Case Studies

The section provides the case study background and analysis to determine the cogency of the proposed hypotheses. The two case studies present similar operating environments the US military will likely encounter as it refocuses on the Pacific Region.⁶⁸ The Pacific Region's vast size presents substantial impediments to basing, tempo, and operational reach. Naval airbase construction on Wake Island and infrastructure improvements in South Vietnam before major operations demonstrated the use of contractor support to existing military engineering capabilities to gain operational access. This section presents an overview, focused questions, and analysis for both case studies. The overview of the case provides strategic context and details pertinent to the analysis of the hypotheses. The focused question portion provides detailed responses to the focused question with supporting evidence. The analysis portion evaluates the evidence presented by each focused question and determines if the case study supports, does not support, or produces a mixed outcome for the proposed hypotheses.

Case Study #1: Wake Island

The Wake Island atoll held little strategic or operational value before World War II. Located 2,000 miles due west of Pearl Harbor, 1,100 miles southwest of Midway, and 1,334 miles from Guam, the atoll sits in one of the most remote locations in the North Pacific.⁶⁹ Shown in Figure 1, Wake, Wilkes, and Peale Island⁷⁰—the three islands that form the atoll—create a rough “V” shape that is 4.5 miles long and 2.5 miles wide at the opening of the lagoon.⁷¹ A coral reef

⁶⁸ DoD, *Sustaining US Global Leadership*, 2.

⁶⁹ Gordon L. Rottman, *World War II Pacific Island Guide: A Geo-Military Study* (Westport: Greenwood, 2002), 35.

⁷⁰ Ibid., 37. Spanish explorer Alvaro de Medaña discovered Wake Island in 1568. Samuel Wake, the captain of a British schooner, named the large island after himself when he rediscovered the atoll in 1796. The smaller two islands received their names from Commander Charles Wilkes and Titan Peale, a naturalist, who visited the atoll on a United States exploring expedition in 1841.

⁷¹ Rottman, *World War II Pacific Island Guide*, 35.

extends thirty to one thousand yards off shore, preventing deep draft ships from approaching the island or laying anchor. Coral heads in the extremely shallow lagoon in the center of the islands prevent ship and seaplane passage. The flat terrain rises only twenty-one feet above sea level, encompasses less than four square miles of land mass, is void of fresh water, and is home to only birds, rats, and marine life.⁷² Annexed by the US in 1899, the Navy found the atoll “strategically insignificant” and failed to mark it as US possession on many government maps.⁷³



Figure 1. Wake Island, December 1941

Source: Figure created by the author.

Following the First World War, Japan and the United States looked to the Pacific for economic growth, regional influence, and defense against potential threats. The Washington

⁷² Bonita Gilbert, *Building for War: The Epic Saga of the Civilian Contractors and Marines of Wake Island in World War II* (Oxford: Casemate, 2012), 20.

⁷³ Ibid., 37.

Naval Treaty of 1922 limited naval construction among the five leading powers to include the United States and Japan until 1936.⁷⁴ In spite of these limitations, both the United States and Japan developed war plans in preparation for an inevitable conflict. In the 1930s, the US War Plan Orange called for an advanced screen of fortifications west of Hawaii as a first line of defense against attack and to deny Japanese access to Pearl Harbor.⁷⁵ An airfield and refueling base on Wake Island would also enable a United States response if the Japanese attacked the Philippines. A fortified airbase at Wake Island would allow the United States to gain operational access to strike Japanese-controlled islands in the Pacific, namely the Marshall Islands located six hundred miles southwest of the atoll.

In 1934, President Roosevelt placed Wake Island under operational control of the US Navy; however, the restrictions of the 1922 Washington Naval Treaty prohibited military base development west of Hawaii to include Midway, Wake, and Guam.⁷⁶ Nevertheless, Pan American Airlines requested to lease Wake Island from the US Navy to construct a seaplane base and hotel to allow its four-engine Clipper aircraft and its passengers to refuel and rest as the company shuttled passengers between Hawaii and the Philippines.⁷⁷ This “back-door opportunity” allowed the US Navy to get a head start on gaining operational access to the Pacific before the 1922 treaty expired in 1936. The following year, Pan American Airlines constructed a seaplane way station on Peale Island, the Pan American Airlines Hotel, water catch basins, and a garden to support its biweekly flights.⁷⁸ Commercial development ultimately enabled escalation of military construction in the years to come at Wake Island.

⁷⁴ Gilbert, *Building for War*, 19.

⁷⁵ Schultz, *Wake Island*, 9.

⁷⁶ Gilbert, *Building for War*, 26.

⁷⁷ Schultz, *Wake Island*, 13.

⁷⁸ Gilbert, *Building for War*, 26.

With war looming in Europe, Congress passed the 1938 Naval Expansion Act, which included provisions to investigate the expansion of naval bases in the Pacific and the Atlantic. Ultimately, Congress appropriated \$7.5 million to construct a naval airbase and defensive fortifications on Wake Island.⁷⁹ To expedite the construction, the Naval Airbase Construction Board selected a consortium known as Contractors Pacific Naval Air Bases (CPNAB) to complete the programmed scope over a three-year period. By December 1941, there were 1,146 civilian contractors, 70 Pan American Airline Employees, 449 Marines, 69 Sailors, and 5 US Army Air Force signalmen stationed on Wake Island.⁸⁰ On December 8, 1941, the Japanese began their attack on Wake Island. Air attacks continued over the next several weeks followed by an invasion and surrender of the US garrison at 1330 on December 23, 1941. The attack resulted in 70 contractors killed, 12 wounded, 98 conscripted for force labor on the island, and nearly 1,000 taken into internment camps in Northern China.⁸¹ Likewise, the Marines, Navy, and Army Air force suffered 59 killed, 49 wounded, and 419 prisoners of war.⁸² Japanese landing party losses were estimated at 280 killed and 333 wounded. The Imperial Japanese Navy held Wake Island for the remainder of the war, surrendering aboard the USS *Levy* on September 4, 1945. The remainder of this section asks focused questions pertaining to the case study to gather evidence in support of or against the proposed hypotheses.

The first question is what were the construction and engineering support requirements to ensure operational access. The answer to this question is that the US Navy determined that it must construct a naval air base, supporting defensive fortifications, and a potential submarine base as quickly as possible across extended lines of communication on an island that provides minimal resources to support human life and construction. The detailed answer to this question includes

⁷⁹ Gilbert, *Building for War*, 26.

⁸⁰ Rottman, *World War II Pacific Island Guide*, 37-38.

⁸¹ Ibid., 38.

⁸² Ibid.

the military surveys and project estimates to determine the scope of work and cost estimate, the phased construction effort, and the operational limitations and challenges that contributed to the engineering and construction problem.

A revision to War Plan Orange called for Wake Island to provide air cover for the Navy's assault on the Marshall Island.⁸³ Deliberate military surveys of Wake Island between 1934 and 1940 allowed the US Navy to estimate the project costs and obtain funding from Congress. In November 1934, the chief of naval operations ordered the USS *Nitro* to visit Wake Island to conduct a preliminary survey before granting access to Pan American Airlines. Under the guise of surveying for commercial purposes, the *Nitro* survey confirmed the viability of Wake Island as a seaplane base, but identified a significant dredging requirement in the lagoon and the channel between Wilkes and Wake Islands.⁸⁴ The Pan American Airlines gathered data, collected drawings, and estimated building materials for the Navy during the remainder of 1935. The expiration of the Naval Treaty restrictions in 1936 gave the Navy authorization to conduct further surveys and studies in February and March. With engineering data on hand, the Navy only required Congress to appropriate the \$7.5 million budget to solicit the project.

Construction would take place in stages across the three islands to provide sufficient life support for construction crews to complete the airfield. First, the atoll required broad dredging to create a channel between Wilkes and Wake Islands, to include a turning basing and bulkhead. Projects on Wake Island included two camps, each at opposite ends of the island. Camp 1, located on the southern tip of the island, consisted of US Marine barracks and officer's quarters, electrical power generation, fresh water supply, mess facilities, and a post exchange. Camp 2, on the north end, consisted of contractor barracks, a commissary, barbershop, and recreational facilities. A five thousand foot long airfield, with shorter cross-runways would be constructed at the apex of the island. Airfield support facilities included a twenty-five thousand gallon aboveground

⁸³ Rottman, *World War II Pacific Island Guide*, 30.

⁸⁴ Gilbert, *Building for War*, 28.

gasoline storage tank, crew living quarters, and eight ammunition magazines. Peale Island projects included a seaplane base, naval hospital, barracks, and a concrete ramp and apron for Navy patrol planes. A seven mile crushed coral road would follow the counter of the Wake and Peale Island and join the two base camps. Accessible only by boat, projects on Wilkes Island consisted of defensive structures and above ground storage tanks. In May 1941, the Navy approved construction for full island defenses at Wake. Defenses included “the project underway for twelve patrol planes, emergency aviation facilities for thirty-six fighters, anchorage for seaplane tenders and light naval forces, accommodations and hospital for on defense battalion, three months storage of food and fuel, and a base for six submarines.”⁸⁵ The ship channel and turning basing had chief importance above all project elements. This allowed Wake to remain strategically important in the Pacific.⁸⁶ Wake Island sat two thousand miles away from its supply base in Honolulu, Hawaii. The Navy would have to ship all construction materials, personnel, and food to the atoll over several months to establish a base of operations before the naval airbase could be completed.⁸⁷

The second question was what military or contracted engineering means were allocated to ensure operational access. Initially, the Navy only dedicated contracted engineering means to Wake and Civil Engineer Corps project supervisors. In 1939, Congress authorized cost-plus-fixed-fee contracts for construction on outlying Pacific Islands based on Rear Admiral Ben Moreel’s recommendation.⁸⁸ A cost-plus-fixed-fee contract is a contract where the agent, in this case the US Navy, reimburses the contractor for all construction related costs plus a previously agreed upon fee to allow for profit. The Navy assumed all the risk using this type of contract; however, it allowed the contractor to begin mobilizing before the engineers finalized the design.

⁸⁵ Gilbert, *Building for War*, 99.

⁸⁶ Ibid., 104.

⁸⁷ Ibid., 42.

⁸⁸ Ibid., 31.

In August 1939, the Navy awarded a \$14,707,500 construction contract to CPNAB for the construction of five naval air stations: Ford Island, Kaneohe, Johnston, Palmyra, and Midway Islands.⁸⁹ The CPNAB consortium included Hawaiian Dredging, Turner Construction and Raymond Concrete and Pile.

In 1940, with the growing crisis in Europe and the threat of Japan, Congress approved over \$7 billion for national defense, to include funding for additional naval bases on Guam, Cavite in the Philippines, and Wake Island.⁹⁰ CPNAB expanded to include Morrison-Knudsen of Boise, Idaho and J.H. Pomeroy and Co., Inc. of San Francisco. The new consortium signed a contract for \$30.87 million including a fixed fee of \$1.6 million on July 1, 1940.⁹¹ Morrison-Knudsen served as the primary contractor responsible for construction on Wake, Midway Island, and an underground fuel storage facility on Oahu, Hawaii. Morrison-Knudsen possessed the necessary experience and leadership to complete the scope of work. Before Wake, Morrison-Knudsen constructed the Hoover Dam on the Nevada-Arizona border. Morrison-Knudsen's vice-president, George Youmans, managed all of the Company's projects from Hawaii while Nathan "Dan" Teters supervised construction on Wake as the superintendent. Teters, an Army Signal Corps veteran from the First World War, held a degree in engineering from Washington State College and had over thirty-eight years of experience in construction.⁹² Harry Olsen, Teters's deputy, supervised construction during construction of Bonneville and Grand Coulee Dams in Washington State.⁹³ At one point, Teters supervised 1,146 construction, engineering support, and

⁸⁹ Gilbert, *Building for War*, 32-33.

⁹⁰ Ibid., 33.

⁹¹ Ibid.

⁹² Gregory John William Urwin, *Facing Fearful Odds: The Siege of Wake Island* (Lincoln: University of Nebraska Press, 1997), 72.

⁹³ Gilbert, *Building for War*, 13.

service contractors on Wake.⁹⁴ Teter's leadership and Morrison-Knudsen's expertise proved invaluable during all phases of construction. Navy Civil Engineer Corps Lieutenant H.W. Butzine was the only military personnel assigned to Wake Island when Morrison-Knudsen's pioneer party landed on January 8, 1940.⁹⁵

The third focused question asked why the US military used construction and engineering support contractors instead of uniformed forces. The answer to this question is simple; the Navy lacked an organic expeditionary construction capability, therefore it had to look to the private sector. Wake Island's harsh weather, remote location, lack of natural resources, and threat of attack from Japanese forces required a highly skilled and experienced contractor who was comfortable with uncertainty. Morrison-Knudsen offered a highly skilled, experienced, and responsive team who stood ready to meet the environmental and operational challenges. The Navy's evaluation criteria during their screen process included the contractor's experience, reputation, reliability, and the ability to provide management, labor, materials, and equipment. As previously mentioned, Morrison-Knudsen's senior leaders had a wealth of experience on large-scale projects. The company ensured it had the right skill sets to accomplish the work within the contractual deadlines. For example, in October 1941, Morrison-Knudsen's labor force included 933 journeymen, 151 apprentices, and 87 foremen.⁹⁶ The Navy officers responsible for supervising the contracted work throughout the Pacific consistently praised the efficiency and skilled labor at Wake Island.⁹⁷

The exceptional work of the CPNAB, and Morrison-Knudsen in particular, could not halt the Navy's desire to develop an organic construction capability. Shultz states, "the Contractors interment demonstrated the Navy's requirement for organized naval construction battalions

⁹⁴ Rottman, *World War II Pacific Guide*, 37.

⁹⁵ Urwin, *Facing Fearful Odds*, 76.

⁹⁶ Gilbert, *Building for War*, 172.

⁹⁷ Urwin, *Facing Fearful Odds*, 82.

(Seabees), although the decision had already been made.”⁹⁸ Moreell, the chief of the Bureau of Yards and Docks, recognized a problem with using civilians on remote construction locations. Distance and time created discontent; and the threat of Japanese attack resulted in high employee turnover at remote bases in the Pacific. On December 28, 1941, the Navy developed its first construction battalion, or CB (Seabees), for short.⁹⁹ The attack on Pearl Harbor aided in the rapid built up of the new Seabee battalions. Sailors within the Seabee ranks had many of the same experience and trade skills as private contractors. During World War Two, over 325,000 men and 8,000 officers of the Civil Engineer Corps served in the “151 regular construction battalions, 39 special construction battalions, 164 construction battalion detachments, 136 construction battalion maintenance units, 5 pontoon assembly detachments, 54 regiments, 12 brigades, and under various designations, 5 naval construction forces.”¹⁰⁰ The Navy slowed began reducing the strength of the Seabee battalions after World War Two. In 2014, only six active and six reserve component Seabee battalions remain to support operational access and navy construction requirements.

The fourth focused question was were the construction and engineering support contractor expeditionary. Morrison-Knudsen demonstrated expeditionary capability through its responsiveness and ability to operate in forward areas. The CPNAB, to include Morrison-Knudsen, established a central headquarters in Hawaii. The consortium forward positioned management, a full accounting staff, engineering design departments to include, electrical, mechanical, structural, and waterfront design, and a planning department.¹⁰¹ Morrison-Knudsen

⁹⁸ Shultz, *Wake Island*, 39.

⁹⁹ Gilbert, *Building for War*, 266.

¹⁰⁰ Department of the Navy, “Seabee History: Formation of the Seabees and World War II,” Navy History & Heritage Command, accessed October 21, 2014, <http://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/seabee-history/world-war-ii.html>.

¹⁰¹ Gilbert, *Building for War*, 41.

hired and transported its own sub-contractors since there was no local population on Wake Island. Most importantly, CPNAB assumed control of Pier 31-A in Honolulu, Hawaii to oversee the “transshipment of materials and men to the outlying islands.”¹⁰² A marked advantage of using contractors is their ability to quickly scale their force to changing requirements.

Following the signing of CPNAB consortium contract, Morrison-Knudsen did not hesitate to identify ready and capable workers throughout the Pacific Northwest and California. They impressed the CPNAB leadership by quickly opened a hiring office in Boise, Idaho and contracting 140 workers.¹⁰³ After arriving on Wake in December 1940, the USS *William Ward Burrows* ferried new hires and those wishing to leave the remote island on a monthly basis. Morrison-Knudsen recognized potential labor problems and took measures to reduce turnover and complacency. The Navy did not allow alcohol or women on Wake; however, it made exceptions for senior contracting leaders and Pan American Airlines. To occupy the construction workers off-duty time, Teters built a three-story outdoor movie theater for daily showings. The company printed a daily news bulletin and provided quality food, to include an ice cream parlor. While these expenses may appear frivolous, it minimized turnover to five percent each month, an amount far less than other projects in the Pacific.¹⁰⁴ In summary, CPNAB and Morrison-Knudsen demonstrated expeditionary capability by maintain a forward headquarters that could rapidly respond to operational requirements and scale their workforce as needed.

The fifth focused question asked if construction and engineering support contractors provided innovative and expert solutions. Complex engineering and construction problems require innovative and expert solutions. The lack or availability of engineering and construction capabilities often limits the military’s ability to solve these problems. As previously discussed, the Navy lacked an organic construction capability when the strategic situation required forward

¹⁰² Gilbert, *Building for War*, 41.

¹⁰³ Ibid., 84.

¹⁰⁴ Ibid., 172.

basing options for the navy, and eventually the Army Air Force. Cutting the ship channel and turning basin through the shallow coral lagoon remained the largest obstacle in the way of Wake becoming a viable Naval Air Station. The US Army Corps of Engineers had dredges in their inventory during World War II; however, Midway received funding for dredging operations, not Wake.¹⁰⁵ This problem did not stop Morrison-Knudsen. As a private company and member of a consortium, they had the flexibility and means to purchase the Dredge *Columbia* for use on Wake. The tough coral lagoon proved tough for the *Columbia*, but the fact is that the contractors provided equipment solutions when the US military could not.

Morrison-Knudsen effectiveness on Wake spurred from the experience and mindset of their leadership. In her work, *Building for War*, Bonita Gilbert emphasized that "experienced, reliable key men was essential to organize and supervise the challenging Wake project, and time was of the essence."¹⁰⁶ Morrison-Knudsen's success in the heavy construction business came largely in part by embracing new technology, leveraging joint ventures and partnerships, and their commitment to hiring and retaining the best leaders and expert. For example, Olson supervised cofferdam and crib construction on the swift waters of the Columbia River before taking the job at Wake Island; bringing experience that would help combat the harsh conditions in the Pacific. The Company also relied heavily on mechanized equipment, bringing over 100 vehicles to Wake's motor pool in 1941.¹⁰⁷ On September 9, 1941, the contractors witnessed the fruits of their hard labor when nine westbound US Army B-17 Flying Fortresses landed on Wake's new crushed coral runway for refueling. For many, this event emphasized Wake's strategic importance in increasing America's operational reach and basing in the Pacific.¹⁰⁸

¹⁰⁵ Gilbert, *Building for War*, 30.

¹⁰⁶ Ibid., 11.

¹⁰⁷ Urwin, *Facing Fearful Odds*, 84.

¹⁰⁸ Gilbert, *Building for War*, 141.

The final focused question was did the US military ensure interoperability with construction and engineering support contractors. The US military ensures interoperability with contractors through oversight, integration into assigned missions, and protection. On Wake, the Navy provided proper control of Morrison-Knudsen, but they failed to provide sufficient operational support and protection to complete construction before the Island fell to the Japanese on December 23, 1941.

The Nye Committee's investigation of suspected abuses by ammunition manufacturers during the First World War led the to stiffer control over defense contractors. This left CPNAB subject to "budgets, deadlines, strict government oversight, and layers of navy supervision that attended every plan and action."¹⁰⁹ Navy Civil Engineer Corps officers like LT Butzine served as the Wake Island Resident Officer-in-Charge, responsible for inspections and progress during the initial months of the project. Lieutenant Commander E.B. Greey replaced Butzine as the project expanded during the summer of 1941. Pleased with the project's progress, Butzine and Greey maintained an excellent working relationship with Teters and his contractors. Progress on the ship canal, airfield, and base camps remained the priority, but Teters offered labor and equipment to support Pan American Airlines and the Marines preparing defensive positions the Island. On Hawaii, the 14th Naval District under Rear Admiral Claude C. Bloch "supervised the public works division in charge of construction of shore establishments under the defense contracts and provided navy transportation to and from the outlying islands."¹¹⁰ Operational support to Morrison-Knudsen suffered primarily from a lack of available naval transportation vessels and the approval of construction plans.

Morrison-Knudsen relied upon Navy vessels and barges to transport personnel, equipment, building materials, food, supplies, and, most importantly, water. Everything needed for work and survival had to be imported. The contractors did their best to balance the amount of

¹⁰⁹ Gilbert, *Building for War*, 4.

¹¹⁰ Ibid., 41.

workers on Wake with the availability of work and materials; however, “when more cargo space was allocated for food, less was available for concrete, lumber, or steel girders.”¹¹¹ Often there were not enough naval vessels to transport enough materials to maintain a consistent tempo during construction. Transportation and logistics problems increased due to German U-boat attacks in the Atlantic, causing President Roosevelt to direct the US Navy to redeploy fleet units to the Atlantic. This produced a shipping shortage in the Pacific and slowed work between May and August 1941.¹¹² In addition, the Navy’s bureaucratic decision-making process, interdepartmental frictions, and arguments over plans cost the project time and money, frustrating the contractors. Additional concerns rose over the plan to protect or evacuate civilians from Wake if an attack was from Japan became imminent.

Wake presented greater risk as the furthest Pacific island construction job. Many contractors from the Northwest and California jumped at the opportunity, trusting the War Department to provide for their safety. However, the Navy did not develop a contingency plan for the contractors if Japan attacked except to anticipate that some of them would volunteer to aid the defense.¹¹³ Many contractors volunteered to assist the Marines, under the commander of MAJ James Devereux, and underwent weapons training.¹¹⁴ Despite intelligence pointing to an imminent attack on Pearl Harbor, the Navy made not effort to evacuate the contractors. Before Wake fell, contractors successfully increased basing options and operational reach for the US Navy in the Pacific. However, it was not until 1945, when the Navy reclaimed Wake from the Japanese, that the Navy could use Wake to maintain operational tempo against the Japanese.

¹¹¹ Urwin, *Facing Fearful Odds*, 80.

¹¹² Ibid.

¹¹³ Gilbert, *Building For War*, 4.

¹¹⁴ James P.S. Devereux, *The Story of Wake Island* (Philadelphia: J.B. Lippincott Company, 1947), 26.

Wake Island Findings and Analysis

The first hypothesis states that when construction and engineering support contractors are expeditionary, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The evidence suggests support for this hypothesis. Joint doctrine identifies the requirement for armed forces to deploy to austere locations and foreign theaters and immediately accomplish their mission. This study assumed that contractors must fulfill the same requirement to support operational access as described in the JOAC and JCEO. At Wake Island, Morrison-Knudsen and CPNAB demonstrated the ability for contractors to forward position the necessary construction and administrative means to solve engineering problems in a responsive manner. As a result, the Navy established a new base from which to conduct operations and extend operational reach.

The second hypothesis states that when construction and engineering support contractors provide innovative and expert solutions, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The evidence suggests support for this hypothesis. A lack of organic naval construction capability presented an opportunity for Morrison-Knudsen to provide the necessary equipment to complete the project's scope of work. Teters and Olsen's experience on previous large-scale projects like the Hoover, Bonneville, and Grand Coulee Dam contributed to the quality and efficiency of the work completed on Wake Island. Teters maintained operational tempo by quickly scaled his highly skilled workforce to match the level of work on the Island.

The last hypothesis states that when the US military ensures interoperability with construction and engineering support contractors then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The evidence suggests a mixed outcome for the hypothesis. The Navy carefully oversaw Morrison-Knudsen's performance, however the Navy's availability of transportation assets and bureaucratic systems inhibited the contractor's ability to make better progress. More importantly, the Navy

failed to make provision for protecting the contractors given the nature of the Japanese threat. One can conclude a lack of interoperability between the US military and construction and engineering support contractors reduced the joint force commander's ability establish and maintain basing, maintain operational tempo, and extend operational reach. However, it is inconclusive whether these conditions would have improved if the Navy provided greater operational support and protection of the contractors.

Case Study # 2: Vietnam War

The French colony of Vietnam experienced political and military turmoil following World War Two. The Viet Minh, led by Ho Chin Minh, conducted an insurgency against the French authority, known as the First Indochina War, which lasted from 1946 until 1954. During the war, the Viet Minh established of a communist government in Hanoi while democratic supporters formed a rival government in Saigon. In the aftermath of the First Indochina War, the 1954 Geneva Convention temporarily divided the Republic of Vietnam in the South and the North Democratic Republic of Vietnam in the North along the seventeenth parallel. Political support for the South Vietnam passed from France to the United States following France's decisive defeat at the Battle of Dien Bien Phu. The 1954 agreement prohibited the construction of new military bases in South Vietnam; therefore, in 1955, the US Navy established construction supervision offices in Thailand to support military assistance operations.¹¹⁵

In the 1960s, US military assistance increased as South Vietnam demonstrated its inability to quell the growing communist insurgency and North Vietnamese threat. In mid-1965, the United States committed regular combat troops to fight alongside the South Vietnamese. The United States recognized the logistical and engineering challenges preventing a large

¹¹⁵ Adrian Traas, *Engineers at War: The United States Army in Vietnam* (Washington, DC: Center of Military History, 2010), 2. The Navy had responsibility for Southeast Asia, including South Vietnam. In December 1955, the Navy established an engineering office in Bangkok, Thailand, initially to supervise contractors building air bases in that country.

commitment of combat troops to suppress the rising communist aggression.¹¹⁶ Therefore, the US military hired additional contractors to build the supporting infrastructure. For the first time, civilian contractors provided the bulk of theater and operational level engineering support.¹¹⁷ Troop build up peaked in 1969, following the defeat of the North Vietnamese and Viet Cong's Tet Offensive. In 1969, with waning American support for the war, President Richard Nixon implemented Vietnamization—a policy oriented on transferring responsibility of combat operations to the South Vietnamese forces in conjunction with a withdraw of US troops. In 1973, The United States concluded direct combat operations in South Vietnam, and in 1975, the North Vietnamese captured Saigon, South Vietnam's capital, resulting in a unified communist state.

This case study discusses the use of construction and engineering support contractors to support operational access in South Vietnam between 1962 and 1966. The US military relied upon contractor support throughout the war, but this period encompasses the rapid escalation of contractor involvement and infrastructure construction in support of major operations. An overview of South Vietnam's geography and existing infrastructure is important to understanding the engineering problem faced by US engineers and contractors.

South Vietnam's geography presented many challenges to military planners. The country hosted a diverse array of geographic features to include, an extended coastline, central highlands, marshy lowlands, dense jungles, and over the Mekong River Delta. Cambodia and Laos bordered South Vietnam to the West, while the South China Sea and the Gulf of Thailand bordered to the East and Southwest. South Vietnam's limited infrastructure proved to be its greatest weakness. Saigon served as the nation's sole deep draft harbor and primary air terminal.¹¹⁸ Limited exports and exposure to potentially damaging typhoons prevented the creation of harbors outside of

¹¹⁶ Traas, *Engineers at War*, 11.

¹¹⁷ Robert M Friedman, "Civilian Contractors on the Battlefield: A Partnership with Commercial Industry or Recipe for Failure?" (master's thesis, US Army War College, 2002), 5.

¹¹⁸ Carter, "The Vietnam Builders," 45.

Saigon.¹¹⁹ As of 1966, there were only six airfields capable of landing jet aircraft.¹²⁰ Primary paved roads and railways followed the coastal contour and connected major cities. Secondary roads reaching into the central highlands were generally unpaved and near impassable during monsoon season.

The first question is what were the construction and engineering support requirements to ensure operational access. South Vietnam's infrastructure presented significant challenges for operational access. However, before 1965, the Department of Defense only provided limited engineer support for its advisory mission, not in preparation for an expanded conflict. International economic aid served as the only means to improve the road network to the Central Highlands and upgrade Saigon's limited airport.¹²¹ As the US advisory mission expanded, the need for facilities that were more permanent became evident. It was also obvious that the South Vietnamese Air Force required additional airstrips to provide tactical air and transportation support to its counterinsurgency mission. This included jet-capable airstrips at Bien Hoa and Da Nang, and all-weather runways at Pleiku and Can Tho.¹²² Military planners estimated engineering and construction workloads with the assumption that the US military's advisory mission would end by 1964.¹²³

That same year, President Lyndon Johnson authorized a consortium of private firms to begin construction of infrastructure to allow for a broadened US involvement, if necessary. In his article entitled "The Vietnam Builders", James Carters writes, "by the time the Johnson administration decided to escalate Vietnam into a war instead of an aid and assistance program,

¹¹⁹ Department of the Army, *Vietnam Studies: Base Development 1965-1970* (Washington, DC: Government Printing Office, 1972), 7. Reference pages three through twelve for an in depth analysis of South Vietnam's political, geographic, and historical history.

¹²⁰ Ibid.

¹²¹ Traas, *Engineers at War*, 2.

¹²² Ibid., 6.

¹²³ Ibid.

the US mission had already outstripped the capacity of southern Vietnam to receive it."¹²⁴

Military Assistance Command-Vietnam (MAVC) would have to address these deficiencies to provide President Johnson with further military options.

General Westmoreland, the Commander of US Military Assistance Command-Vietnam (COMUSMACV), recognized the vast amount of engineering and construction required to increase troop strength from 23,000 in 1964, to over 184,000 at the end of 1965.¹²⁵ Force levels peaked at 542,000 in February 1969. The United States developed a six-phase deployment program to increase troop levels gradually. Each deployment phase produced an additional sustainment and construction requirement. Westmoreland evaluated the problem at hand and established the following construction priority in order of precedence: airfields, roads, railroads, ports, and logistics bases.¹²⁶ MACV required additional bases with air and sea points of debarkation to support the increased flow of personnel, equipment, and food stores. Therefore, MACV identified Da Nang, Qui Nhon, Cam Ranh Bay, and Saigon for heavy port and airbase construction. Large military installations at Binh Long, Newport, Tan Son Nhut, Cam Ranh Bay, Da Nang, Pleiku, Qui Nhon, Vung Tau, and Nha Trang, shown in Figure 2, included plans for ammunition depots, hospitals, dumps, warehouses, and light industry for military production.¹²⁷ In all, the contractors valued the constructed work at \$1.9 billion by the end of the contract period.¹²⁸

¹²⁴ Carter, "The Vietnam Builders," 45.

¹²⁵ Ibid., 46-47.

¹²⁶ Traas, *Engineers at War*, 12.

¹²⁷ Carter, "The Vietnam Builders," 47-56. For a comprehensive list of the US military construction program in South Vietnam reference: Alfred J. Thiede "U.S. Armed Forces Base Development Experiences in Asia, 1965-69: A Historical Review and Implications for Future Base Development Actions" (master's thesis, US Army Command and General Staff College, 1971), 48.

¹²⁸ Ibid., 56.



Figure 2. South Vietnam Port and Airfield Construction

Source: Adrian Traas, *Engineers at War: The United States Army in Vietnam* (Washington DC: Center of Military History, 2010), Frontispiece.

The second question was what military or contracted engineering means were allocated to ensure operational access. Private contractors provided the bulk of engineering and construction work in South Vietnam between 1954 and 1966. Before 1962, US naval construction teams provided facility to support to US advisors; however, Lieutenant General Paul Harkins, the then-COMUSMACV, requested the US Army to negotiate a contract for facilities engineering to free

more troops for the advisory mission.¹²⁹ This decisions ushered in the several construction firms, the largest being the joint venture of Raymond International of New York, New York and Morrison-Knudsen of Asia Incorporated, of Boise, Idaho (RMK). Both firms had proven records of accomplishment of managing large-scale construction overseas. RMK expected the \$16.5 million cost-plus-fixed-fee-contract to last a couple of years. In 1962, RMK's workforce consisted of 3,000 laborers, 2,900 of which were Vietnamese.¹³⁰ The Navy and Army Corps of Engineers issued smaller contracts to Thomas B. Bourne Associates, Tudor Engineering Company, and Pacific Architects and Engineers, Incorporated for similar scopes of work throughout South Vietnam. Like the military, RMK planned to disband its joint venture at the end of 1964; Johnson's decision to expand MACV's construction program to provide operational access for more forces caught RMK by surprise.

In 1965, RMK expanded the partnership to include two additional contractors—Brown & Root and J.A. Jones (referred hereafter as RMK-BRJ)—to increase the strength and management capacity needed to complete the increased scope of their contract. In the late summer of 1966, RMK-BRJ's workforce reached its peak, employing over 48,000 contractors with 3,700 piece of equipment. Of this number, 39,000 Vietnamese, 5,100 third-country nationals from Korea and the Philippines, and nearly 4,000 US construction supervisors made up the work force.¹³¹ Ninety percent of the construction effort in South Vietnam fell on the joint consortium, earning RMK-BRJ the nickname “Vietnam Builders.” MACV allocated the most critical infrastructure project to contractors while incoming Army engineer and Navy construction battalions assumed projects of lesser importance.

¹²⁹ Department of the Army, *Vietnam Studies: U.S. Army Engineers 1965-1970* (Washington, DC: Government Printing Office, 1974), 27.

¹³⁰ Traas, *Engineers at War*, 5.

¹³¹ Carter, “The Vietnam Builders,” 54.

The third focused question asked why the US military used construction and engineering support contractors instead of uniformed forces. Policy drove the decision to use contractors instead of additional US military engineers to increase operational access to South Vietnam. The United States committed itself to abide by the 1954 Geneva Convention agreement, which restricted the construction of military bases in South Vietnam. Therefore, the only option left was to improve commercial infrastructure through economic aid. In December 1961, Kennedy's administration acknowledged the political and military situation in South Vietnam was getting worse, but McNamara refused to authorize the use of US military engineers on construction projects.¹³² This left the Navy Bureau of Yards and Docks, later renamed Naval Facilities Engineering Command (NAVFAC), to manage construction with private contractors; an option that allowed the US to keep troop levels down and focus military engineering efforts elsewhere.

Relying upon civilian contractors also prevented the deployment of US military engineers between 1962 and 1965. During this time, America's policy and military aim remained focused on advising and assisting the South Vietnamese armed forces. In his public address on July 28, 1965, President Johnson changed his policy to increase troop levels to "do what was necessary to resist aggression but that we would not be provoked into a major war."¹³³ According to Carter, before the addresses, Johnson had hoped to keep the US policy change a secret; therefore he chose to not deploy US military engineers to prepare the theater for additional forces.¹³⁴

The lack of available US military engineers influenced the decision to use contractors for construction projects supporting operational access. In December 1965, the 18th Engineer Brigade controlled ten engineer battalions organized into three engineer groups. The Joint Chiefs of Staff and the Department of Defense approved the deployment of twenty-five engineer

¹³² Traas, *Engineers at War*, 4-5.

¹³³ James T. Currie, "The Army Reserve and Vietnam," *Parameters, Journal of the US Army War College* 14, no. 3 (Autumn 1984): 75.

¹³⁴ Carter, "The Vietnam Builders," 50.

battalions, but this required the activation of reserve units. A month prior, President Johnson's decision not to mobilize Army Reserve and National Guard forces severely limited MACV's ability to support construction missions in South Vietnam. Similar to today, the bulk of the Army's engineer assets resided in the Army Reserves.¹³⁵ Johnson's policy decision created a gap in the available military means; therefore, civilian contractors filled the void until US military engineers arrived in South Vietnam. Furthermore, deploying additional construction battalions could not happen quickly since the Army already committed construction battalions to missions in Europe, Korea, Thailand, and other areas throughout the world.

The fourth focused question was were the construction and engineering support contractor expeditionary. The civilian contractors demonstrated their expeditionary capabilities by being responsive and adaptive to the changing engineering requirements. In his 1971 master's thesis, Major Alfred Thiede, a US Army engineer officer, suggests the mobilization of contractors and US military engineers was not a part of a large-scale plan to optimize the contractors-troop ratio. "It was, instead, a series of actions/reactions to formulate and make the best use of the construction effort that could be made available."¹³⁶ Regardless, the Vietnam War represented a fundamental change where contractors conducted the majority of construction in a theater of operations.¹³⁷

In 1965, Naval supervisors felt confident that RMK-BRJ had "unlimited capacity for expansion and had a proven capability to work in a combat theater."¹³⁸ RMK-BRJ responded rapidly by increasing their workforce to twenty-four thousand contractors by the end of 1965. The joint venture made key leadership adjustments to ensure successful expansion throughout South

¹³⁵ Department of the Army, *Vietnam Studies: Base Development 1965-1970* (Washington, DC: Government Printing Office, 1972), 42.

¹³⁶ Thiede, "U.S. Armed Forces Base Development Experiences in Asia, 1965-69," 93.

¹³⁷ Ibid., 76-77.

¹³⁸ Traas, *Engineers at War*, 14.

Vietnam. Morrison-Knudsen Vice President for Foreign Operations, Lyman Wilbur, deployed to Saigon to assume responsibility of the joint ventures' executive staff. He placed on order \$110 million in equipment, as RMK-BRJ's work expanded from \$4 million of work-in-place per month to \$12 million.¹³⁹ RMK-BRJ's responsiveness and ability to adapt to the changing situation increased operational access for US forces and solidified the joint venture's role as the major construction provider in the theater.

The fifth focused question was did construction and engineering support contractors provide innovative and expert solutions. Civilian contractors demonstrated innovation and expert solutions through construction techniques and company training programs. RMK-BRJ used creative construction techniques during construction of a ten thousand foot AM2 aluminum matting runway as part of the Cam Ramh Bay complex in the II Corps Tactical Zone. Building upon lessons learned from the Seabees at the Chu Lai airfield, RMK-BRJ improved a technique to construct an expeditionary runway at Cam Ramh Bay on an all-sand subgrade.¹⁴⁰ RMK-BRJ used seawater and pneumatic rollers to stabilize the loose, granular soil before applying a bituminous sealer and aluminum matting. Completing the project in November 1965, the aluminum runway, parking apron, high-speed turnoffs, and taxiway gave South Vietnam its fifth jet-capable runway. In less than ideal construction conditions, RMK-BRJ verified contractors could learn from their military counterparts and implement creative solutions to solve engineering problems.

Engineering contractors from the DeLong Corporation enabled the 497th Engineering Company (Port Construction) to construct a second pier at Cam Ranh Bay in just forty-five days. The prefabricated pier system, designed by the DeLong Corporation, consisted of eighteen fifty foot long steel tubes connected to an adjustable barge to create a pier three hundred feet long and ninety feet wide. Traas describes the construction of the DeLong Pier,

¹³⁹ Carter, "The Vietnam Builders," 48.

¹⁴⁰ Traas, *Engineers at War*, 41.

Pneumatic jacks attached to large collars around the caissons were used to jack the barge up on its legs to a usable height. Because of the mud conditions at Cam Ranh Bay, work crews joined three lengths of caissons totaling 150 feet for each leg. Although two sections could be joined before erection, the third had to be welded in place, a process that required twenty days. Most of the fittings and hardware of the barges and caissons arrived in poor condition, but the port construction crews succeeded in repairing or rebuilding the pier's vital components. The first DeLong pier at Cam Ranh Bay took forty-five days for construction by sixteen men. Estimates showed that constructing a timber-pile pier would have required at least six months by a forty-man construction platoon, plus supporting equipment and operators and a large number of hard-to-get timber piles and lumber.¹⁴¹

Its simple assembly and reduced construction time created a demand for more DeLong Piers at Cam Ranh, Qui Nhon, and Vung Tau. Rapid expansion of piers and births increased the throughput of supplies and equipment needed to combat forces throughout the theater.

In 1966, RMK-BRJ instituted a six-week construction program to train 219 Vietnamese students on various skilled needed to improve the quality of construction on their projects.¹⁴² Trained local construction workers provided short-term benefits for RMK-BRJ, such as reduced labor costs, but it also provided long-term benefits for the Vietnam. RMK-BRJ's training program produced tens of thousands of workers trained as carpenters, welders, heavy equipment operations, and many other desired skills.¹⁴³ Similar to Wake Island, RMK-BRJ produced a monthly newspaper that provided project updates, company events, and highlighted employee accomplishments. According to Carter, the newspaper, which highlighted the accomplishment of workers from all nationalities, created a sense of unity and a positive work climate.¹⁴⁴

The final focused question was did the US military ensure interoperability with construction and engineering support contractors. The US military ensures interoperability with contractors through control, operational support, and protection. Between 1955 and 1961, the Naval Officer in Charge of Construction (OICC) in Southeast Asia supervised contractors

¹⁴¹ Traas, *Engineers at War*, 30.

¹⁴² Carter, "The Vietnam Builders," 50.

¹⁴³ Ibid., 57.

¹⁴⁴ Ibid., 54.

working in South Vietnam through its engineering offices in Bangkok, Thailand. In 1961, the OICC established a branch office in Saigon to support the increase in contracted construction to the South Vietnamese Government and MACV.¹⁴⁵ On February 15, 1966, Westmoreland, with the support of McNamara, created the MACV Directorate of Construction, absolving the J-4 of responsibility of managing construction in theater. Lieutenant General Carroll Dunn, the Director of Construction, reported directly Westmoreland, giving the COMUSMACV direct control over all US military engineers and civilian contractors. This allowed MACV to provide unity of effort and command when it came to “project assignment, priorities of effort, and standards of construction.”¹⁴⁶

In 1965, NAVFAC hired additional architect and engineering firms, and increased its construction staff to provide improved operational support to military and contracted workers. The OICC also adjusted RMK-BRJ’s contract from a cost-reimbursement plus-fixed-fee to a cost-reimbursement plus-award-fee. This change provided the contractors with an incentive to exceed project expectations through costs or timesavings. South Vietnam’s limited economy required military engineers and contractors import 90 percent of the needed construction supplies.¹⁴⁷ Therefore, the OICC worked closely with the contractors to reduce lead times and prioritize the flow of construction supplies. Likewise, the 35th Engineer Group placed orders for construction materials through Japan and other Far East markets to avoid having to wait for supplies from CONUS. In summary, the US military made a significant effort to integrate contractors into construction planning and execution processes.

There is not substantial evidence to confirm or deny if the US military took specific measures to provide for contractor protection while serving in a combat environment. Entering the war, the general philosophy was to assign military engineers to engineering and construction

¹⁴⁵ Traas, *Engineers at War*, 5.

¹⁴⁶ Ibid., 110.

¹⁴⁷ Carter, “The Vietnam Builders,” 45.

project closer to anticipated areas of conflict. However, South Vietnam's noncontiguous battlefield and large number of contracted personnel placed contractors closer to the battlefield than ever before.¹⁴⁸ Contractor involvement in the Vietnam War began to raise questions regarding the status of contractors as noncombatants. A discussion of the legal status of contractors as noncombatants is beyond the scope of this study.

Vietnam War Findings and Analysis

The first hypothesis states that when construction and engineering support contractors are expeditionary, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The evidence suggests support for this hypothesis. In South Vietnam, contractors demonstrated their ability to rapidly project the necessary skilled labor, construction management, and administrative support into a foreign theater of operations. Moreover, construction and engineering support contractors successfully increased basing, operational tempo, and operational reach at a time when US policy limited the use of military engineers.

The second hypothesis states that when construction and engineering support contractors provide innovative and expert solutions then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The evidence suggests support for this hypothesis. In South Vietnam, contractors used creative construction methods in unfavorable conditions to rapidly construct airfields and ports to increase the flow of US forces and sustainment goods. In addition, RMK-BRJ instituted training programs to increase the competency of their Vietnamese workforce while conducting ongoing construction projects. The construction of additional airfields and ports throughout South Vietnam allowed the COMUSMACV to conduct simultaneous combat operations to control the tempo of the fighting against the North Vietnamese Army.

¹⁴⁸ Stephen M. Blizzard, "Increasing Reliance on Contractors On the Battlefield," *Air Force Journal of Logistics* 28, no. 1 (Spring 2004): 3. Blizzard's article provides further analysis on the historical use of contractors in support of military operations and its legal ramifications.

The last hypothesis states that when the US military ensures interoperability with construction and engineering support contractors then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The evidence suggests support for this hypothesis. The development of the MACV Directorate of Construction integrated the engineering and construction work conducted by both military engineers and civilian contractors under a unified command. At the operational level, this allowed the COMUSMACV greater control over all engineering efforts and increased flexibility. Likewise, supporting agencies such as NAVFAC increased the size of their engineering force to support the expanded use of contractors. As a result, contractors and combat force maintain operational tempo and delivered construction projects as scheduled.

This section presented the background and analysis of two case studies to determine the validity of the study's proposed hypotheses. The selected case studies focused on the Pacific region to reflect operational environments that the joint force may encounter as it refocuses on the region. The JOAC and JCEO emphasize the necessity for operational access to shape the environment, deter potential threats and adversaries, and defeat potential threats. The Pacific Region's vast size presents substantial impediments to basing, tempo, and operational reach. Naval airbase construction on Wake Island before World War Two and infrastructure improvements in South Vietnam demonstrate the use of civilian contractors to supplement existing military engineering capabilities to gain operational access. This section provided an overview and the strategic context that informed the analysis of each case study. The focused question portion provided a detailed response to the research questions. The findings and analysis section determined whether proposed hypotheses were supported, unsupported, or produced a mixed outcome based upon the evidence from each case study.

Findings and Analysis

This purpose of this section is to conduct a structured, focused comparison of the findings and analysis of the Wake Island and Vietnam case studies. A structured, focused comparison of both case studies allows the researcher to determine if the findings and analysis across both case studies indicate a greater trend in the role of operational art in operational access. Four portions makes up this section, introduction, findings, analysis, and summary. The findings portion provides a summary and synthesis of the case study findings for each focused question. Next, the analysis portion conducts a comparative analysis of the proposed hypotheses, determining if the evidence supports, does not support, or produces a mixed result across both case studies.

The first question asked what were the construction and engineering support requirements to ensure operational access. At Wake Island, the US Navy rapidly constructed a naval air station, with supporting defensive fortifications and life support facilities to increase operational reach in the Western Pacific, and to provide early warning of a Japanese attack. Wake Island's remote location and lack of natural resources, namely fresh water, presented significant operational and construction challenges. In South Vietnam, MACV required the design and construction of a vast network of airfields, roads, ports, and logistic bases to support an increase of over 160,000 troops between 1964 and 1965. The evidence from both case studies portrays complex construction and engineering problems of varying scope and scale. Construction and engineering requirements came as result of a change to an operational plan (Wake Island) or national policy (South Vietnam).

The second question asked what military or contracted engineering means were allocated to ensure operational access. Morrison-Knudsen, a member of the CPNAB consortium, was the sole provider of construction and engineering means for the Wake Island Project. However, the US Navy provided shipping vessels to transport construction material and Morrison-Knudsen's equipment between Hawaii and Wake Island. Private contractors, namely the joint venture of RMK-BRJ, provided the bulk of engineering and construction work in South Vietnam between

1954 and 1966. Both case studies highlighted the large demand for construction and engineering assets to support operational access.

The third focused question asked why the US military used construction and engineering support contractors instead of uniformed forces. At Wake Island, the US Navy lacked an organic expeditionary construction capability, therefore it outsourced its engineering capability to Morrison-Knudsen, a highly skilled and experienced contractor comfortable with Wake Islands harsh weather, remote location, lack of natural resources, and threat of attack from Japanese forces. United States national policy of limiting the number of combat troops on the ground drove the decision to use contractors instead of additional US military engineers to increase operational access in South Vietnam. In short, a lack of organic capability or political limitations created conditions where using contractors allowed the US military to ensure and maintain operational access in a theater of operations.

The fourth focused question asked whether the construction and engineering support contractor were expeditionary. Morrison-Knudsen demonstrated expeditionary capability through its responsiveness and ability to build the Wake Island naval air station and supporting facilities despite its remote location. In general, Morrison-Knudsen successfully scaled its workforce and equipment to meet the operational requirements and limitations. In South Vietnam, RMK-BRJ also demonstrated expeditionary capability by quickly responding and adapting to the changing operational requirements. Expanding the role of contractors to increase operational access in South Vietnam was possible because the US military incorporated contractors as part of the total engineering force. In both case studies, the US military incorporated contractors early into construction and engineering operations because of their proven responsiveness and adaptability.

The fifth focused question asked if construction and engineering support contractors provided innovative and expert solutions. At Wake Island, Morrison-Knudsen provided critical dredging equipment and experience. Likewise, Morrison-Knudsen's success in the heavy construction business came largely in part by embracing new technology, leveraging joint

ventures and partnerships, and their commitment to hiring and retaining the best leaders and experts. In Vietnam, contractors provided innovative construction solutions such as the DeLong Pier and the AM2 expeditionary runway. RMK-BRJ's six-week construction training program increased the number of qualified Vietnamese construction workers, resulting in reduced construction costs. As demonstrated in both case studies, contractors have greater flexibility and means to rapidly leverage industry technology and experience.

The final focused question asked if the US military ensured interoperability with construction and engineering support contractors. On Wake, the Navy provided proper oversight of Morrison-Knudsen, but they failed to integrate and protect them before the Island fell to the Japanese on December 23, 1941. On the contrary, MAVC provided exceptional oversight and integration of contractors in support of construction and engineering operations. There was inconclusive evidence if MACV took specific measures to provide for contractor protection while serving in a combat environment. However, it is important to note that the United States did not suffer a loss of civilian contractors on a scale similar to Wake Island.

Structured, Focused Comparison Analysis

The first hypothesis states that when construction and engineering support contractors are expeditionary, then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. Joint force commanders rely upon expeditionary capabilities to seize the initiative by deploying along multiple lines of operations during entry operations.¹⁴⁹ A comparison of the findings from the Wake Island and Vietnam case studies suggests support for this hypothesis. First, both cases demonstrated how the US military used contractors to fulfill engineering and construction requirements in a foreign theater of operations. Second, contractors exhibited responsive and adaptive leadership to ensure the deployment of personnel, material, and equipment to complete infrastructure, basing, and facility construction requirements. Third, contractors had experienced leaders, familiar with the challenges of

¹⁴⁹ JOAC, iii.

constructing large projects in remote or austere environments. Therefore, one can conclude that expeditionary construction and engineering support contractors can support operational access requirements as part of the joint force.

The second hypothesis states that when construction and engineering support contractors provide innovative and expert solutions then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. The JCEO recognizes the need to overcome infrastructure obstacles that prevent the execution of joint entry operations and the expansion of the lodgment.¹⁵⁰ A comparison of the findings from the Wake Island and Vietnam case studies suggests support for the hypothesis. Both case studies demonstrated that internal limitations and external constraints led the US military to use contractors to solve complex engineering problems. Wake Island's remote location and rough environmental conditions exceeded the US Army and Navy's organic engineering and construction capabilities. Likewise, the political mandated force cap in South Vietnam prevented MACV from expanding South Vietnam's infrastructure to support a dramatic surge of US forces into theater. In short, capability gaps within the joint force or the application of political constraints establish conditions where contractors can leverage innovate and expert solutions to ensure operational access.

The final hypothesis states that when the US military ensures interoperability with construction and engineering support contractors then joint force commanders are able to establish and maintain basing, maintain operational tempo, and extend operational reach. As described in the methodology section, Army doctrine includes contractors as part of total force during planning and executing operations.¹⁵¹ This study specifically considered how the US military oversaw, integrated, and protected contractors while contributing to operational access. A comparison of the findings from the Wake Island and Vietnam case studies suggests a mixed

¹⁵⁰ JCEO, 1.

¹⁵¹ ATTP 4-10, 5-1.

outcome for the hypothesis. The Wake Island case study findings suggest a mixed outcome because the US Navy provided sufficient oversight, but failed to sufficiently integrate or protect its contractors during directed missions. In South Vietnam, the findings suggest support for the hypothesis due to satisfactory oversight, integration, and protection of contractors. Analysis points to differences in strategic context between the two case studies. Wake Island was part of a larger effort to increase basing and operational reach throughout the Pacific region. The tyranny of distance limited the US Navy's ability to adequately integrate and support its dispersed contractors. Conversely, in South Vietnam, MACV could centralize oversight, integration, and protection across the entire theater of operations. Therefore, the strategic context of a given operation may govern the interoperability of contractors and the US military in support of operational access. Table 1 provides a summary of the hypotheses findings and analysis.

Table 1. Summary of Findings and Analysis

Hypotheses	Wake Island	Vietnam	Hypotheses Outcome
Expeditionary contractors allow the JFC to establish and maintain basing, maintain operational tempo, and extend operational reach	Supported	Supported	Supported
Innovative and expert solutions from contractors allows the JFC to establish and maintain basing, maintain operational tempo, and extend operational reach	Supported	Supported	Supported
When the US military ensures interoperability with contractors then the JFC is able to establish and maintain basing, maintain operational tempo, and extend operational reach	Mixed Outcome	Supported	Mixed Outcome

Source: Table developed by the author

This section provided a structured, focused comparison of the findings and analysis of the Wake Island and Vietnam case studies. A review of the findings for the six structured questions allowed the reader to understand the major empirical evidence found in both case studies. Next, a comparative analysis of the findings and analysis from both case studies suggested support for the first and second proposed hypotheses, but produced a mixed outcome for the last proposed hypothesis. The next section provides a summary of the research and discusses its implications

for military planners and policymakers regarding the use of construction and engineering support contractors to support operational access missions.

Conclusion

The United States maintains a requirement to project combat power across the globe to pursue its national interests and strategic objectives. To this end, the JOAC describes how the joint force gains and maintains operational access against armed opposition that employs A2AD capabilities.¹⁵² The JCEO supports this operational concept by defining the operational requirements, to include establishing a lodgment, to support the flow of combat power to complete assigned missions.¹⁵³ Operational art provides the theoretical foundation for both the JOAC and JCEO, particularly in regards to basing, operational tempo, and operational reach. The joint engineer force supports operational access through the construction and repair of bases and supporting infrastructure.

President Obama's strategic focus on the Pacific Region presents new operational access challenges as the United States reduces its military forward basing due to fiscal constraints and strategic objectives.¹⁵⁴ However, the joint engineer force is inexperienced and ill prepared to support operational access missions following over a decade of stability operations. An opportunity exists to leverage construction and engineering expertise within the private sector to supplement existing military engineers to support operational access requirements. Private contractors can provide innovative and expert solutions to engineering problems; however, they must exhibit expeditionary capabilities and interoperability with existing military forces to remain a viable option for joint force commanders. This was the focus of the study.

Using the theoretical lens of operational art, the study examined the use of basing, operational tempo, and operational reach as they applied to the operational access missions at Wake Island and in Vietnam. The intent of these two case studies was to demonstrate the validity of JOAC and JCEO concepts in similar contexts, thus confirming the applicability of these

¹⁵² JOAC, ii.

¹⁵³ JCEO, vi.

¹⁵⁴ DoD, *Sustaining US Global Leadership*, 2.

concepts to the United States' strategic focus in the Pacific Region. This study used a structured, focused comparison of the outcomes, presenting evidence to support the three proposed hypotheses relating expeditionary capabilities, innovative and expert solutions, and ensured interoperability.

The conclusion of this analysis is that the joint force should consider the use of construction and engineering support contractors to supplement existing engineering capabilities to ensure operational access. The case study evidence supports the claim that integration of construction and engineering support contractors during Phase I (Deter) and Phase II (Seize the initiative) operations allows joint force commanders to establish and maintain basing, maintain operational tempo, and extend operational reach. Both case studies support the hypotheses for contractors to exhibit expeditionary capabilities and provide innovate and expert solutions; however, the US military must do more to ensure interoperability with contractors during dispersed operational access missions. The remainder of this section describes the implications of this study and provides recommendation to operational planners and policymakers for the use of contractors in support of future operational access missions.

As part of the “Total Force,” contractors will remain an essential part of military operations for the near future.¹⁵⁵ As such, operational planners must clearly evaluate existing military engineering capabilities and operational requirements to identify specific gaps. Additionally, policymakers may limit the scope and scale of military operations to achieve or prevent a desired effect. Nevertheless, operational access requirements are likely to remain, and the use of contractors may provide joint force commanders with a greater range of options. Operational planners and policymakers should consider these factors to help achieve US strategic objectives in the Pacific Region.¹⁵⁶ For example, increased security cooperation with Asian-Pacific nations might require expansion of permanent or temporary basing for US forces.

¹⁵⁵ ATTP 4-10, 5-12.

¹⁵⁶ DoD, *Sustaining US Global Leadership*, 2.

Additional permanent basing in the Pacific Region will likely require hardening to protect forces from potential Chinese or North Korean threats.¹⁵⁷ Further research on the use of contractors to support operational access requirements will strengthen the three proposed hypotheses. Analysis of historical case studies outside of the Pacific Region, contractor support to multinational or coalition partners, and the use of contractors in non-permissible environments will help fill research gaps. The findings suggest further research on interoperability between the US military and contractors operating in dispersed environments.

The research included in this study focused on the viability of using construction and engineering support contractors to supplement existing engineer capabilities to ensure operational access. Using the theoretical lens of operational art, a structured, focus comparison of the evidence from Wake Island and Vietnam suggested support for the proposed hypotheses that expeditionary contractors who provide innovative and expert solutions help joint force commanders ensure and maintain basing, operational tempo, and extend operational reach. Further investigation on how the US military ensures interoperability with contractors will allow operational planners to better achieve the JOAC and JCEO's operational access concepts and strategic objectives in the Pacific Region.

¹⁵⁷ Michael J. Lostumbo et al., *Overseas Basing of US Military Forces: An Assessment of Relative Costs and Strategic Benefits* (Santa Monica: RAND Corporation, 2013), xxxii, accessed December 7, 2014,
http://www.rand.org/content/dam/rand/pubs/research_reports/RR200/RR201/RAND_RR201.sum.pdf.

Bibliography

- Army Doctrinal Publication 3-0, *Unified Land Operations*. Washington, DC: Government Printing Office, 2011.
- Army Doctrinal Reference Publication 3-0, *Unified Land Operations*. Washington, DC: Government Printing Office, 2012.
- Army Doctrinal Reference Publication 4-0, *Sustainment*. Washington, DC: Government Printing Office, 2012.
- Army Tactics, Techniques, and Procedures 4-10, *Operational Contract Support Tactics, Techniques, and Procedures*. Washington, DC: Government Printing Office, 2011.
- Blizzard, Stephen M. "Increasing Reliance On Contractors On the Battlefield." *Air Force Journal of Logistics* 28, no. 1 (Spring 2004): 3.
- Carter, James M. "The Vietnam Builders: Private Contractors, Military Construction and the 'Americanization' of United States Involvement in Vietnam." *Graduate Journal of Asia-Pacific Studies*, no. 2 (November 2004): 44.
- Currie, James T. "The Army Reserve and Vietnam." *Parameters, Journal of the US Army War College* 14, no. 3 (Autumn 1984): 75.
- Curtis Jr., Donald R. "Civilianizing Army Generating Forces." Master's thesis, US Army War College, 2000.
- DeBow, Michael J. "Construction Contracting: Strategic and Operational Engineering Harnesses the Private Sector in Support of United States National Security Objectives." Master's thesis, US Army War College, 1996.
- Department of Defense. *Sustaining Us Global Leadership: Priorities for the 21st Century Defense*. Washington, DC: Government Printing Office, 2011.
- Department of the Army. *Vietnam Studies: Base Development 1965-1970*. Washington, DC: Government Printing Office, 1972.
- _____. *Vietnam Studies: U.S. Army Engineers 1965-1970*. Washington, DC: Government Printing Office, 1974.
- Department of the Navy. "Seabee History: Formation of the Seabees and World War II." Navy History & Heritage Command. Accessed October 21, 2014.
<http://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/seabee-history/world-war-ii.html>.
- Devereux, James P.S. *The Story of Wake Island*. Philadelphia: J.B. Lippincott Company, 1947.
- Field Manual 3-34, *Engineer Operations*. Washington, DC: Government Printing Office, 2014.
- Flyvbjerg, Bent. "Case Study" In *The Sage Handbook of Qualitative Research (Sage Handbooks)*. 4th ed, edited by Norman K. Denzin and Yvonna S. Lincoln, 301-16. Thousand Oaks:

- Sage Publications, Inc., 2011.
- George, Alexander L., and Andrew Bennett. *Case Studies and Theory Development in the Social Sciences*. Cambridge: The MIT Press, 2005.
- Gilbert, Bonita. *Building for War: The Epic Saga of the Civilian Contractors and Marines of Wake Island in World War II*. Oxford: Casemate, 2012.
- Joint Publication 1-02. *Department of Defense Dictionary of Military and Associated Terms*. Washington, DC: Government Printing Office, 2010.
- Joint Publication 3-0. *Joint Operations*. Washington, DC: Government Printing Office, 2011.
- Joint Publication 3-34. *Joint Engineer Operations*. Washington, DC: Government Printing Office, 2011.
- Joint Publication 4-0. *Joint Logistics*. Washington, DC: Government Printing Office, 2008.
- Joint Publication 4-10. *Operational Contract Support*. Washington, DC: Government Printing Office, 2014.
- Krause, Michael D, and Cody R Phillips. *Historical Perspectives of the Operational Art*. Washington, DC: Military Bookshop, 2010.
- Lostumbo, Michael J. et al., *Overseas Basing of U.S. Military Forces: An Assessment of Relative Costs and Strategic Benefits*. Santa Monica: RAND Corporation, 2013. Accessed December 7, 2014.
http://www.rand.org/content/dam/rand/pubs/research_reports/RR200/RR201/RAND_RR201.sum.pdf.
- Naveh, Shimon. *In Pursuit of Military Excellence: the Evolution of Operational Theory*. London: Routledge, 1997.
- North Atlantic Treaty Organization, AAP-06. *NATO Glossary of Terms and Definition (English and French)*. Brussels: NATO Standardization Agency, 2014.
- Office of the Chairman, Joint Chiefs of Staff. *The Joint Concept for Entry Operations V1.0*. Washington, DC: Government Printing Office, 2014.
- _____. *Joint Operational Access Concept V1.0*. Washington, DC: Government Printing Office, 2012.
- Rottman, Gordon L. *World War II Pacific Island Guide: A Geo-Military Study*. Westport: Greenwood, 2002.
- Schultz, Duane. *Wake Island*. New York: St. Martin's Press, 1978.
- Schwartz, Moshe, and Jennifer Church. *Department of Defense's Use of Contractors to Support Military Operations: Background, Analysis, and Issues for Congress*. Washington, DC: Congressional Research Service, 2013. Accessed January 18, 2015.
<https://www.fas.org/sgp/crs/natsec/R43074.pdf>.

Svechin, Aleksandr A. *Strategiya*. 2nd ed. Moscow: Voennyî Vestnik, 1927. Quoted in Michael Krause and R, Cody Phillips. *Historical Perspectives of the Operational Art*. Washington, DC: Center of Military History, 2007.

Svechin, A. *Strategy*. Edited by Kent D. Lee. Minneapolis: East View Publications, 1992.

Thiede, Alfred J. "U.S. Armed Forces Base Development Experiences in Asia, 1965-69: A Historical Review and Implications for Future Base Development Actions." Master's thesis, US Army Command and General Staff College, 1971.

Toomey, Charles L. "Base Development in Modern Contingency Operations: Can Active Army Engineers Meet the Task?" Master's thesis, School of Advanced Military Studies, 1990.

Traas, Adrian. *Engineers at War: The United States Army in Vietnam*. Washington, DC: Center of Military History, 2010.

Triandafillov, V. Cass Series *On the Soviet Study of War*. Ed. by Jacob W. Kipp. Vol. 5, *The Nature of the Operations of Modern Armies*. Ilfor: F. Cass, 1994.

Urwin, Gregory John William. *Facing Fearful Odds: The Siege of Wake Island*. Lincoln: University of Nebraska Press, 1997.